Arizona Career Technical Education Delivery System Project Report

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Acknowledgements

Executive Summary

The Arizona Department of Education (ADE), Career and Technical Education (CTE) Division commissioned Joanna Kister, Education and Workforce Consultant, Columbus, Ohio, to *"provide research documents to improve the Arizona Career and Technical Education (CTE) delivery system. The report is to focus on a coherent sequence of instruction that should result in exemplary CTE program delivery for Arizona."*

Approach and Methods

The study included four phases: (1) conducting an in-depth analysis of the current delivery system in Arizona based on career technical education resources; (2) researching the national CTE literature and state and local district exemplary models; (3) collecting input from Arizona stakeholders; and (4) synthesizing data and developing recommendations.

The research included an extensive review of the national CTE literature, state web sites, and interviews. Three groups were surveyed: business and industry representatives, a random selection of CTE teachers, and all CTE directors. A total of 16 business and industry surveys and 119 CTE teacher and director surveys were analyzed. Two focus groups were conducted with a random selection of ten CTE directors and all members (19) of the Arizona Department of Education, CTE Division staff. Responses from CTE directors and teachers represent all 15 counties and 65 schools/districts.

Findings

CTE is an essential component of the total educational system in the United States and is critical to the country's ability to compete in a global economy. The policy context for CTE encompasses such factors as legislation, economics, globalization, the labor market, technology, demographics, and the current state of CTE.

The research addressed these components of CTE:

- Mission of CTE in the American High School
- Standards, curriculum, and instruction for CTE systems
- Accountability and technical assessments for CTE systems
- Delivery system for CTE
- Criteria and components of a quality CTE program

- State policy and leadership

Additionally, state CTE best practices were reviewed as having promise for adaptation or replication in Arizona. States with coherent systems of CTE were profiled. Promising practices profiled include academic and CTE integration; alignment of CTE standards; curriculum and assessment; dual and concurrent enrollment; career pathways; technical assessments; statewide articulation; technical endorsements on diplomas; state data systems; and workforce employer surveys.

It was noted that there is much to be commended in the current CTE system. Both the state accountability system and revised system of curriculum development are strengths. The regular meetings of local CTE Directors with Division staff provide for frequent communications. The *2001-2002 Customer Satisfaction Survey Report* showed a high level of satisfaction of the local directors and teachers with the services of the Division.

Recommendations

There are five comprehensive recommendations for the CTE delivery system and additional more detailed recommendations for program improvement.

1. **Develop, with input of all stakeholders, a shared vision and a clear and compelling mission statement. Disseminate widely and use consistently in all communications.** The second part of the recommendation is to communicate a new shared vision and mission within the CTE community and to the citizens of Arizona.

2. **Increase the access to CTE for more students.** Review state policies for high school graduation that eliminate the general track and require all students to take a concentration.

3. **Eliminate the mandate for the current three levels for the Arizona CTE delivery model. Replace with a set of competencies that are industry determined, reflect the national career clusters, and span grade levels into postsecondary studies.** Currently the Department is prescriptive of both standards and process. Local school districts vary considerably in size, structure, and resources. Therefore, local districts should retain the flexibility to determine how those standards translate into a program of study and delivery. The caveat, however, is that students have access to quality courses that meet the state standards. It is recommended that what is currently Level III require a sequence that is a minimum of three courses, preferably four, in a single labor market area for those students who select a career major

4. **Institute a system of technical assessments for CTE.** The current system of sign-off for competencies is not robust for accountability purposes and does not offer value to students for their graduation portfolios. Most states with strong accountability systems prescribe an industry certification test, a licensure test (particularly health and cosmetology), or an end-of-program assessment such as National Occupational Competency Testing Institute (NOCTI) assessments.

5. **Integrate CTE into the mainstream of high school education in Arizona by strengthening the academic and technical rigor of CTE curriculum and instruction.** Investigate High Schools That Work (HSTW) as a whole school reform model that includes a focus on CTE. Much of the focus in Arizona CTE has been on implementing the structure of the three levels and on the recording and reporting required in the state accountability system. It appears that less focus has been placed on strengthening the teaching and learning processes. However, it should be recognized that considerable effort has been placed in developing new curriculum.

Other recommendations relate to delivery structures such as career academies, alternative scheduling structures, revising data systems, utilizing community college placement exams, implementation of program assessment guidelines, state workforce survey, and several suggestions related to staff development.

The Division is to be commended for its efforts in continuous improvement. The driver for implementation of the research findings in this report should be the quest for a shared vision and mission for CTE and involvement of stakeholders in redesigning the delivery system.

Chapter 1
Introduction

The study is in response to a Request for Quote (RFQ) issued by the Arizona Department of Education (ADE), Career and Technical Education Division (CTED). The RFQ called for a study to *"provide research documents to improve the Arizona Career and Technical Education (CTE) delivery system. The report is to focus on a coherent sequence of instruction that should result in exemplary CTE program delivery for Arizona."*

The research included four phases: (1) analyzing the current delivery system in Arizona based on CTE resources; (2) researching the national CTE literature and state and local district exemplary models; (3) collecting input from Arizona stakeholders; and (4) synthesizing data and developing recommendations.

Problem Statement

The focusing question is: *What should be the delivery system for CTE in Arizona?*

Academic standards and implementation of Arizona's Instrument to Measure Standards (AIMS) have resulted in increased pressure on the current delivery system for CTE—particularly the time required for the recommended sequence of courses. This context is mirrored nationally. The interim report of the National Assessment of Vocational Education (Silverberg et al. 2002) asserts that academic reform dominates the high school agenda. Nearly every state has established new and higher standards for high school graduation. And nearly every state is struggling to redefine the role of CTE in secondary education.

Work, particularly those jobs in the fastest growing occupational areas, requires increasingly high levels of academic and technical skills. According to surveys conducted for the report *Vocational Education in the United States: Toward the Year 2000,* most employers reported that front-line skill requirements are increasing (Levesque et al. 2000).   The challenge for federal and state policymakers is to address the competing demands for emphasis on academic and career technical education.

Methodology

The recommendations in this paper were drawn from research studies and literature in CTE, an analysis of the current CTE system in Arizona, including surveys and focus groups, and a study of selected state systems.

Phase 1. Conducted an in-depth analysis of the current delivery system in Arizona based on CTE resources.

The following resources were analyzed:

- Curriculum Design Process and Materials Format Report 5-8-01
- Arizona CTE Web site
- *Local Program Assessment Guide for Arizona Vocational Technical Education* (ADE, CTED 2000)
- Arizona performance measures results
- *The Handbook: Secondary Career and Technical Education Resource Handbook for CTE Administrators* (ADE, CTED 2001)
- Tech Prep web site
- *Secondary FY 2003 Guidelines for Program Evaluation and Continuous Improvement* (ADE, CTED 2002c)
- *Arizona Vocational Education Accountability System,* (ADE, CTED 2000)

Arizona accountability outcome data and funding issues were also evaluated.

Phase 2. Researched national, state, and local district resources with a particular focus on exemplary models.

The process to select states for benchmarking exemplary practices included a demographic analysis and a review of state department of education (SDE) and other CTE-related websites to determine comparability of program delivery systems to Arizona. It is also recognized that state economies vary considerably in labor market needs.

The researcher also interviewed leaders and directors of national CTE-related organizations and consortia and staff of the National Dissemination Center for Career and Technical Education (NDCCTE), reviewed state websites and resource materials, and drew from experiences working in states and with the National Association of State Directors of Career Technical Education Consortium (NASDCTEc).

It was also determined that some states had best practices that could be replicated in Arizona regardless of differences or similarities in demographic variables.

Phase 3. Collected input from 129 Arizona stakeholders and conducted two focus groups.

Two surveys were developed:

1. **Business and industry.** The purpose of this survey was to assess business and industry satisfaction with and expectations for academic, technical, and employability skills. The survey also assessed perceptions of the extent to which the state CTE system meets emerging labor market needs and recommendations for improving the system.

2. **CTE directors and teachers.** The purpose of this survey was to determine effectiveness of the design and the degree of implementation of the three levels of the Arizona model for delivery of CTE. Respondents were asked to assign a rating to the design and implementation, describe strengths and limitations of the model, and recommend changes.

The following processes were used to collect input:

- Electronic mailing lists were provided by ADE CTED for the following:
  - Members of the Governor's Workforce Policy Board and State program advisory committees
  - All CTE directors
  - Approximately ten percent of CTE teachers
- Surveys were sent to e-mail addresses with provisions for replying online or faxing or mailing. Respondents were also given the opportunity to phone during scheduled times or to provide times for the researcher to call. In some cases, the researcher asked for additional clarifying or probing information.
- Data were analyzed, using both quantitative and qualitative methodologies.

The researcher also conducted two focus groups, one with randomly selected directors and one with CTED staff. The focus group protocol was focused on recommendations for the delivery model.

Phase 4. Synthesized data and developed recommendations.

Limitations

Gathering the state benchmarking data depended upon securing information from state websites and verifying information with members of SDE staff. Some website links were no longer operative. Some states are in the process of developing new CTE standards and policies.

The survey process was limited by a number of inaccurate e-mail addresses. The response from business and industry was limited.

Organization of the Report

The report is organized around the components of a CTE system as depicted in Figure 1.

**Figure 1
Career Technical Education System**
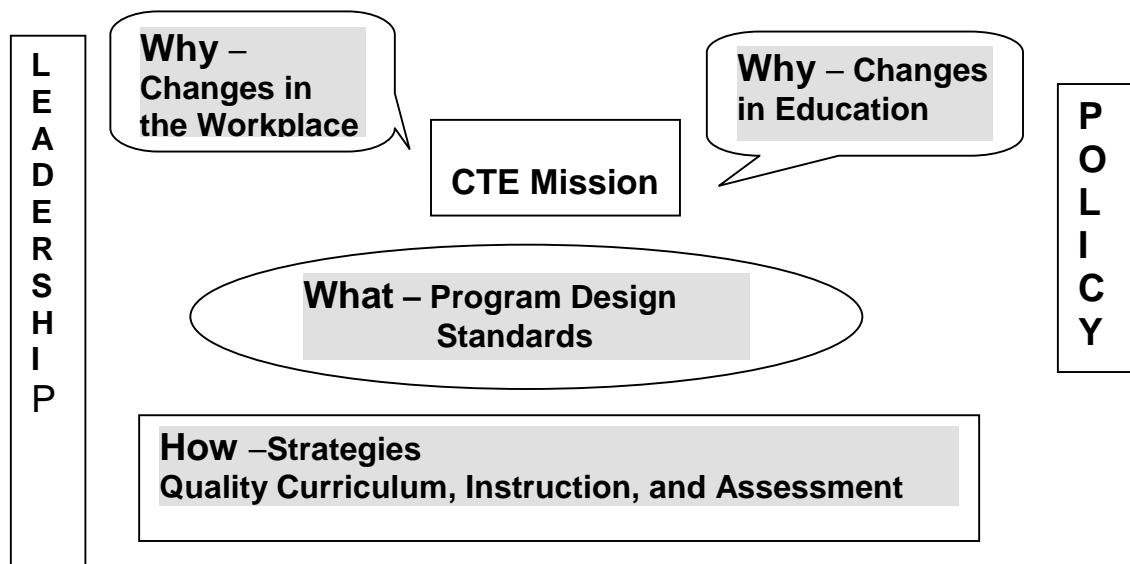
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Chapter 2 provides an environmental scan of the policy context, including the two realms of CTE—workforce development and education. Chapter 3 focuses on the mission of CTE and its role in secondary education. Chapter 4 addresses standards (academic, technical, and employability), curriculum, and integration of academic and career technical instruction for CTE. Since an investigative research report was produced for ADE, CTED in 2001 with recommendations for

curriculum design process and materials format, this chapter will primarily feature updated information related to the topic.

Chapter 5 addresses accountability, including industry certifications and technical assessments. Chapter 6 includes an analysis of research and best practices related to scope and sequence and program design. Chapter 7 contains the analysis of the survey and focus group data from Arizona career technical educators. Chapter 8 describes components of quality CTE programs, including the role of high school reform initiatives, staff development, and leadership. Chapter 9 benchmarks and analyzes best practices from selected states that could be replicated in Arizona. Chapter 10 addresses state policy and leadership, including governance and funding issues.

Finally, Chapter 11 includes recommendations and strategies for implementation for the Arizona CTE delivery system. The appendixes contain the survey instruments, focus group data, and the demographic data of survey respondents.

Chapter 2
Policy Context for Career Technical Education

This chapter begins with the policy context for CTE. CTE is an essential component of the total educational system in the United States and is critical to the country's ability to compete in a global economy (NASDCTEc 2001). CTE provides students and adults with:

- The technical skills and knowledge necessary to succeed in occupations and careers
- The cross-functional skills, or workplace basics, necessary for success in any occupation or career (such as problem solving, teamwork, and the ability to find and use information) as well as skills for balancing family and work responsibilities
- The context in which traditional academic skills and a variety of more general educational goals can be enhanced

The standards movement and academic reform of the past decade created a new context for CTE. Other major contextual factors include legislation, economics, globalization, the labor market, technology, demographics, and the current state of CTE. The chapter concludes with a discussion of the implications for addressing the skills gap, the educational requirements for jobs, and the decision drivers for CTE programs.

Contextual Factors

Career technical educators must be responsive to changes in education and in the workplace. Jack Welch said "*Master the context or* surrender to it."

> *Master the context or surrender to it.*
>
> *Jack Welch*

Legislation

The U.S. Constitution is silent about public education and does not establish a formal role for the federal government. State constitutions assign to each state the specific responsibility and legal authority for public education. Vocational education, like all of education, is primarily the domain of states and local districts. Federal legislation, however, has played an important role in influencing vocational education systems.

The purpose of the ***Carl D. Perkins Vocational and Technical Education Act of 1998*** (Perkins III) is to *"develop more fully the academic, vocational, and technical skills of secondary students and postsecondary students who elect to enroll in vocational and technical education."* Congress made several substantive changes to the Perkins Act in 1998 that are reflected in these themes (Silverberg et al. 2002):

- **Increased emphasis on academics.** The stated purpose of the 1998 law suggests that federal vocational education funds be directed toward improving both academic and vocational-technical skills.
- **Greater flexibility in the use of funds.** Set-aside funding streams for gender equity were eliminated as were other funding distribution requirements weighted toward special population groups.
- **More funds directed to the local level.** Elimination of the set-asides allowed a higher proportion of Perkins funds to pass to local districts.
- **Creation of a "higher stakes" accountability system.** Perkins III imposed requirements for state reporting to the U.S. Department of Education and potential rewards and consequences for states that can and cannot improve student performance, including the performance of special populations.
- **Improved coordination with related initiatives.** Language in both the Workforce Investment Act (WIA) and Perkins III were intended to provide opportunities to integrate vocational education institutions into state and local workforce development and job training systems.

The ***Workforce Investment Act of 1998,*** which authorized the new Workforce Investment System, also impacts CTE. State and local workforce investment boards were established. New youth councils were set up as a subgroup of the local board to guide the development and operation of programs for youth. The legislation also created a One-Stop delivery system, with career centers in neighborhoods for access to core employment services and referral to job training, education, or other services. Assistant Secretary of Labor Emily DeRocco, in recent comments to the National Association of State Workforce Agencies, said that an administration goal is to integrate the Youth, Perkins, and Apprenticeship programs.

The **School-to-Work Opportunities Act of 1994** was established to help states establish comprehensive, statewide school-to-work (STW) systems. Systems were required to have three components: school-based learning, work-based learning, and connecting activities in schools. That legislation has expired.

Arizona received $23 million over a five-year period from the U.S. Department of Labor for STW. Evaluators (Gau 2001) found that the state of Arizona created a STW system that had a modest positive impact on the involvement of students, schools, and businesses in career-related activities in Arizona. Implementation varied considerably across the regional partnerships. The study concluded that strong leadership and direction at the state level is critical to development and implementation of a highly effective statewide STW system.

States are working to comply with the provisions of the **No Child Left Behind Act** (2001). The No Child Left Behind (NCLB) Act requires states to implement statewide accountability systems covering all public schools and students. These systems must be based on challenging state standards in reading and mathematics, annual testing for all students in grades three to eight, and annual statewide progress objectives ensuring that all groups of students reach proficiency within 12 years. Assessment results and state progress objectives must be broken out by poverty, race, ethnicity, disability, and limited English proficiency to ensure that no group is left behind. School districts and schools that fail to make adequate yearly progress (AYP) toward statewide proficiency goals will, over time, be subject to improvement, corrective action, and restructuring measures aimed at getting them back on course to meet state standards.

NASDCTEc (2002) developed a paper on coordination between NCLB and Perkins:

> *In general, the areas that NCLB seeks to coordinate with Perkins are related to state plans (Title I, Section 1111) and local plans (Title I, Section 1112). There were also opportunities to enhance secondary schools, including the "integration of vocational technical programs" into school-wide improvement programs (Title I, Section 1114) and coordinating these plans with provisions under the Perkins Act where applicable. School-wide improvement programs, according to NCLB, are described as strategies to assess student needs, align curriculum with academic standards, integrating vocational and technical education programs, providing professional development for school personnel, college and career awareness and preparation programs and other similar programs. Another area of coordination is for targeted assistance to schools (Section 1115, Targeted Assistance Programs), where Perkins could be coordinated with state and local plans.*

Other areas of policy and coordination with CTE include teacher quality and professional development.

Economics and Globalization

The *"new economy"* in the United States is characterized by growth in technology and knowledge-based jobs and by the impact of globalization. The skill requirements of the knowledge-based workplace have created economic disparity between the educated and uneducated. New economy jobs occur in all industry sectors, including manufacturing, not only in high-tech firms. The Progressive Policy Institute (Atkinson et al. 1999) contrasted old and new economies based on descriptions of economy-wide, industry, and workforce characteristics (see Table 1).

Table 1
Comparison of Old and New Economies

Issue	Old Economy	New Economy
Markets	Stable	Dynamic
Scope of Competition	National	Global
Organizational Form	Hierarchical, Bureaucratic	Networked, Entrepreneurial
Potential Geographic Mobility of Business	Low	High
Competition between Regions	Low	High
Organization of Production	Mass Production	Flexible Production
Key Factor of Production	Capital/Labor	Innovation/Knowledge
Key Technology Driver	Mechanization	Digitization
Source of Competitive Advantage	Lowering Cost Through Economies of Scale	Innovation, Quality, Time to Market, and Cost
Importance of Research/Innovation	Moderate	High
Relations with Other Firms	Go it Alone	Alliances and Collaboration
Principal Policy Goal	Full Employment	Higher Wages and Incomes
Skills	Job-specific Skills	Broad Skills, Cross-Training
Requisite Education	A Skill	Lifelong Learning
Labor-Management Relations	Adversarial	Collaborative

Issue	Old Economy	New Economy
Nature of Employment	Stable	Marked by Risk and Opportunity
Source: Atkinson et al. (1999)		

The National Governor's Association (NGA) (1999) describes the American economy as global and highly competitive. Driving forces are ideas, knowledge, services, and higher-order skills. Innovation and change have replaced tradition. The NGA report describes the following factors as unique:

- The new economy is global.
- Knowledge and innovation are the key inputs of the "weightless" new economy.
- The new economy places a premium on skills and education.
- Small, fast-growing firms power job growth.
- Information technology is at the core of all business.
- Markets and businesses are dynamic.

Our students will compete in a world economy. But globalization will affect low-skilled or unskilled American workers very differently. As labor costs become more important to manufacturers than shipping costs, the United States will retain almost no comparative advantage in low-skilled manufacturing (Judy & D'Amico 1997). Technology will broaden the boundaries of markets for goods and services.

The volume of international trade is expanding rapidly. Ten percent of United States gross domestic product (GDP) is based on exports and over 13 million jobs depend directly on our ability to export goods and services freely to other nations (Employment Policy Foundation 2002).

Even small companies in rural areas now compete with, sell to, or receive supplies from companies and markets half way around the world. According to the *Skills Gap 2001* report (National Association of Manufacturers 2001), to continue to succeed, U.S. manufacturers must compete less on cost than on product design, productivity, quality, and responsiveness to customer needs. *"These competitive mandates put a high premium on the skills, morale, and commitment of workers."*

Labor Market

Over the 2000-2010 period, total employment is projected to increase by 15 percent in the United States today (Hecker 2001). The service-producing sector will continue to be the dominant employment generator in the economy, adding

20.5 million jobs by 2010. Within the goods-producing sector, construction and durable manufacturing will contribute relatively modest employment gains.

Health services; business services; social services; and engineering, management, and related services are expected to account for almost one of every two nonfarm wage and salary jobs added to the economy during the 2000-2010 period. These sectors account for a large share of the fastest-growing industries.

Two-thirds of the fastest growing occupations over the next decade are in the computer and health fields. Eight of the 10 fastest growing occupations are computer-related, commonly referred to as information technology occupations.

Until recently, labor market information resources used different occupational classification systems. All federal information sources are now using the Standard Occupational Classification (SOC), which organizes information about the nature of work, skills and knowledge required to perform the work, employment and wage trends, and a variety of other information into a set of occupational categories. Additional information is provided by O*NET, a detailed database providing information on skills, abilities, knowledge and many other occupational characteristics. O*NET replaces the Dictionary of Occupational Titles (Sommers 2002a).

Technology

We live in an information-dependent global society. Technology is the engine driving productivity. Virtually all jobs in the information age economy require some level of information technology skills.

Information and communications technologies (ICT) change the way we live, learn, and work. An international panel (Educational Testing Service [ETS] 2002) says that technology is of increasing importance in people's everyday lives and that presence will increase in coming years. The panel also developed a definition of Information and Communication Technologies literacy. ICT literacy is *"using digital technology, communication tools, and/or networks to access, manage, integrate, evaluate and create information in order to function in a knowledge society"* and includes skills in the following:

- **Access.** Knowing about and knowing how to collect and/or retrieve information
- **Manage.** Applying an existing organizational or classification scheme
- **Integrate.** Interpreting and representing information; involves summarizing, comparing, and contrasting
- **Evaluate.** Making judgments about the quality, relevance, usefulness, or efficiency of information

- **Create.** Generating information by adapting, applying, designing, inventing, or authoring information

The Internet provides the marketplace for global competition and will dramatically alter the future.

Demographics

From a workforce perspective, the United States labor force is growing older and more diverse. By 2020, almost 20 percent of the U.S. population will be 65 or older. Whites constitute 76 percent of the total labor force today and will account for 68 percent in 2020. The share of African-Americans in the labor force probably will remain constant, at 11 percent. The Asian and Hispanic shares will grow to six and 14 percent, respectively. Most of this change will be due to the growth of Asian and Hispanic workforce representation in the South and West (Judy & D'Amico 1997).

From an educational perspective, public elementary and secondary school enrollment is expected to increase through 2005, and then decrease slowly. The West will experience the majority of this growth in student population. Hispanics are the fastest-growing student group in the nation's elementary and secondary schools. Dropout rates for whites and African-Americans ages 16-24 have declined since 1972 but have remained relatively stable since the early 1990s. The dropout rates for Hispanic youths have not decreased and remain higher than those for other racial/ethnic groups.

In 1988, the William T. Grant Foundation Commission on Work, Family, and Citizenship issued a report, *The Forgotten Half,* which described the magnitude and plight of students who had fallen behind in the struggle for social stability and economic well-being. Ten years later, *The Forgotten Half Revisited* (Halperin 1998) was published. It noted that educational attainment continued to be heavily influenced by family income. High school graduation rates for those in the lowest family income quartile were 25 percent lower than for those in the top quartile. Those in the top income quartile were ten times more likely to earn a college degree than those in the bottom quartile. The report said, *"The most persistent problems in the American economy for many years have been the high youth unemployment rates and relatively low rates of full-time work by America's out-of-school 16-24 year olds."*

Career Technical Education

Vocational education began in the early part of the nineteenth century in response to the industrialization of America. In the latter part of the century, the nature of the labor market changed as described above, and the standards and

accountability movement challenged educators. Employers sought workers who were not only skilled but also academically able (Castellano, Stringfield & Stone 2001). The focus of CTE broadened to include preparation for both work and continued education**.**

A number of themes emerged in CTE in recent decades (Rojewski 2002):

- The integration of academic and vocational education
- Emphasis on developing general (transferable) work skills, rather than focusing on narrow, job-specific work skills
- Articulation between secondary and postsecondary vocational programs (coordinated transition from school to work)
- Adjustments in programs to accommodate changing workforce demographics
- Preparation for a changing workplace that requires fairly high-level academic skills
- Familiarity with and use of high technology
- Higher-order thinking skills including decision making and problem solving
- Interpersonal skills that facilitate working in teams

CTE is big business. According to the interim National Assessment of Vocational Education (NAVE) report, student participation in vocational education nationally remained relatively stable in the 1990s (Silverberg et al. 2002). However, total course taking increased, so the percentage of time spent in vocational education has declined. The NAVE report defines vocational education as encompassing three types of courses: (1) specific labor market preparation (occupational education); (2) general labor market preparation; and (3) family and consumer sciences.

Throughout most of the 1990s, almost 45 percent of all high school graduates earned three or more occupational credits, the equivalent of three year-long courses. Most of these students "concentrated" their courses in a single program area (e.g., health or business).

From 1992 to 1998, the average number of credits earned in vocational education was 4.0. During those years, high school students earned more credits in vocational education (4.0) than in math (3.4) or science (3.1) (Silverberg et al. 2002). There was some evidence that students were exploring across occupational areas.

A recent analysis (Silverberg et al. 2002) supported the hypothesis that vocational course taking may be responsive to labor market demand to some degree. Four programs experienced the largest gains in the proportion of concentrators: health care, child care and education, food service and hospitality, and technology and communications. During the same period, the corresponding job categories had higher than average employment growth.

The largest declines in vocational concentrators were in the trade and industry and business program areas. These areas approximately correspond to occupations that had experienced below average projected growth rates since the 1980s. The NAVE interim report (ibid) says it is unclear whether the consistency in course taking and job growth reflects changes in school program offerings, changes in student preferences, or both. A concern is also expressed that the data provide little evidence that vocational education is concentrating its efforts on preparation for high-skill, high-wage jobs.

Skills Gap

Numerous reports have documented a skills gap in the United States. America has a surplus of low-skilled workers and an alarming scarcity of high-skilled workers—a mismatch between the demand for skilled labor and the available supply (National Skill Standards Board 2001).

The primary finding of the NAM study (2001) was that U.S. manufacturers faced a persistent skills gap in the workforce. What is striking, and relevant to CTE, is that the most severe skills shortages now are with hourly production workers ranging from entry level workers, operators, machinists, and craft workers to technicians and engineers. Despite a slowing economy when the survey was taken in May 2001, 80 percent of American manufacturers reported experiencing a moderate to serious shortage of qualified job candidates. Other findings from the NAM study included these:

- 67 percent of respondents said the lack of skilled workers negatively impacted their ability to maintain production levels to meet customer demand.
- 80 percent said voluntary turnover was highest among hourly production workers.
- 78 percent believed public schools were failing to prepare students for the workplace.
- 50 percent did not believe schools are doing adequate job teaching employability skills.

NAM survey respondents were also asked why they had rejected applications for hourly production workers:

- 69 percent cited "inadequate basic employability" skills (attendance, timeliness, work ethic). This reason was named twice as often as any other.
- 34 percent said insufficient work experience.
- 32 percent said inadequate reading and writing skills.

When asked about deficiencies among current hourly production workers, 59 percent said lack of basic employability skills. The report recommends that the public education system needs improved standards and accountability, but that they also must produce graduates *"familiar with the world of work and skilled enough to succeed in it."*

Lankard (2002) reviewed studies related to employer expectations and reported that in a survey of 400 employers, most important were basic skills, thinking skills, personal quality skills, and interpersonal competencies. In another study, employers identified lack of soft skills (e.g., general social skills, calling if one is going to be late or absent, and staying on the job despite frustrations) as the primary barrier to employment. A panel of business and industry officials who identified *"communication skills"* as the primary skill that employers wanted gave additional support for the importance of employability skills. Specifically, employers wanted workers who had the ability to read for information, interact with customers, talk with customers, listen to other people, negotiate, write, and work well with others.

Educational Requirements for Jobs

The future will depend upon workers who can manage information and technology. Carnevale (1998) said that the economy was producing high-skill, high-wage jobs in every industry, but it continued to lose jobs that once paid well and required only high school degrees. According to Carnevale, more skill was necessary not only to get a job but also to keep one. Employers needed better basic, occupational, and problem-solving skills, as well as continuous skill upgrading.

The economy will continue generating jobs for workers at all levels of education and training, although growth rates are projected to be faster, on average, for occupations generally requiring a postsecondary award (a vocational certificate or other award or an associate or higher degree) than for occupations requiring less education or training (Hecker 2001).

According to *Workforce 2020* (Judy & D'Amico 1997),

> *The jobs that are growing most rapidly also generally pay the best. These are the jobs that require increasingly high levels of skill and knowledge. The highest rewards go to workers with knowledge and skills that are relevant to the workplace. Generic college degrees in and of themselves are not in demand.* (p. 85)

The National Manufacturers Association Skill Gap report (NAM 2001), says that

. . . manufacturers are not alone in pointing out that a fixation—among high school teachers and counselors, students and parents—on four-year university education immediately following high school makes young people shun other attractive options, leaving alternative career and work paths starved for attention and resources. . . . While manufacturers strongly support a strong university system as well as work-based learning and internships, they also point out that many satisfying, remunerative jobs in the future will require a training certificate or an associate degree beyond a high school diploma. These options deserve equal time from school guidance counselors and curriculum designers and equal consideration by students and parents. (pp. 11-12)

Carnevale and Desrochers (2002) analyzed the national adult literacy survey, the current population survey, and the Bureau of Labor Statistics employment projections and projected the distribution of jobs for this decade based on skill requirements (see Table 2).

Table 2
Breakdown of the Labor Force (Ages 16-64) by Literacy Skill Level

Literacy Skill Level	Percentage of—				2000 Earnings
	Labor Force	Job Growth 2000-2010	Jobs 2000-2010	All New Jobs, 2010	
Minimal (Dropout)	15%	13%	10%	12%	$21,500
Basic (Below average h.s. graduate)	24%	13%	22%	25%	$26,900
Competent (Some post-secondary)	35%	15%	36%	37%	$33,400
Advanced/ Superior (Bachelor's degree)	26%	19%	31%	26%	$48,000
Source: Carnevale and Desrochers (2002)					

A severe skills gap was documented in the information technology industry, as well as in other industry sectors and government that were dependent on skilled technology workers (ETS 2002). The U.S. Department of Labor reported that of 54 new jobs in the United States, only eight do not require technological literacy. The bottom line is that our nation's economic vitality is dependent on the knowledge and skills of workers. It calls for a world-class education system that is attentive to both academic and technical education.

Decision Drivers

Sommers (2002b), a labor market economist, identified three program decision drivers for CTE:

- Meeting student demand for training
- Meeting short-term labor market demand for trained workers
- Meeting long-term strategic goals for human resource and economic development

She also noted that there were hidden decision drivers—for example, "We've always had this program" or "The school board president (mayor, county commissioner, business leader, labor leader) want this program—even though it does not appear to be addressing anyone's needs." The challenge to policymakers was to be clear about whose needs are being served when making decisions about what programs to create, expand, reduce, or drop.

Members of business and industry advisory committees and the Arizona Governor's Workforce Policy Board responded to an online survey question regarding the extent to which high school CTE programs were meeting current and merging labor market needs in Arizona. On a scale of 1–10, 10 being high, respondents rated the question a 5.4, slightly above average. One person said, *"It takes several years for the educational system to play catch-up to industry."*

National Policy

In a statement released in February 2003, Assistant Secretary Carol D'Amico charged the following:

- High schools are short-changing students with watered-down classes and low expectations that limit individual choices and personal potential.
- Only one-third of high school students take a high school curriculum that prepares them for college level work; almost 50 percent of those that do enroll in college need remediation; and only about half of college enrollees complete a college program.
- Traditional vocational programs do not offer the academic or technical rigor to adequately prepare students for the demands of postsecondary education or the high-skilled workplace.
- A completely new approach is necessary—one that improves high school academic preparation for all students *and* that draws upon the strengths of community colleges collaborating with high schools to create high quality technical options.

The Administration proposed a shift from *"providing traditional vocational education to an entirely new focus on supporting academic achievement at the*

high school level and on providing high-quality technical education at the community college level that is coordinated with local high schools." The Administration also proposed promoting stronger accountability for results by linking grantee funding to success in achieving student outcomes.

Summary

As Arizona makes decisions regarding the delivery system, the policy context must be considered. That context includes legislation, the impact of economics and globalization on the workforce, the nature of the labor market, demographics, and the current state of CTE. Policymakers should carefully analyze the skills gap in the United States and in Arizona and the educational requirements for technical jobs. They must be clear about the policy decision drivers—meeting student demand, short-term labor market demand, and/or long-term goals for human resource and economic development. The Administration proposal for CTE reauthorization will need to be monitored.

Chapter 3
Mission of Career Technical Education
In the American High School

The delivery system for career technical education must be based upon a well-researched and reasoned purpose for CTE. The focusing question for this chapter is: *What should be the mission for CTE in Arizona?*

One of the highest priorities of the state directors of career technical education is to position CTE central to high school reform (Kister 2001). Several national reports, notably *Breaking Ranks* (National Association of Secondary School Principals [NASSP] 1996) and *High Schools of the Millennium* (Brand & Partee 2000), address the issue of high school reform. Other high school reform efforts include High Schools That Work, the Coalition of Essential Schools, the National Career Academy Coalition, the National Academy Foundation, Talent Development High School, The Big Picture Company, New American High Schools (U.S. Department of Education), The New Urban High School Design, and Tech Prep. The chapter will address first the purpose of high school, then current high school reform initiatives, and finally the mission of CTE in the high school.

Purpose of High School

The *Breaking* Ranks Report

The NASSP (1996) *Breaking Ranks* report describes high schools as a pivotal institution in the lives of young people that can serve as a linchpin in efforts to improve the American condition. The report notes that a global economy leaves few places for Americans without adequate skills because the world is filled with those who will labor for wages for which few in this country could afford to work.

> *The country is diminished to the extent that any high school fails to provide all that it might for every student.*
>
> *Breaking Ranks, 1996*

Fully 40 percent of four-year college students require some form of remediation. Only 34 percent of college students who require remedial reading end up graduating; of those who require remedial math, only 45 percent graduate (American Diploma Project 2003). Four partner organizations—Achieve, Education Trust, Thomas B. Fordham Foundation and the National Alliance of Business—have joined with 15 states for the American Diploma Project. The

goal is to assure that the awarding of an American high school diploma should, at the very least, signify a level of achievement in reading, writing and mathematics that guarantees that American high school graduates have the knowledge and skills they need for success after graduation: in college, the workplace, or the armed services. A critical assumption for this project is that the expectations of higher education (i.e. the ability to read, write, and do math without the need for remediation) are converging with the expectations for success in a high-performance workplace.

The *Breaking Ranks* report (NASSP 1996) called for personalization of high schools and said that high school *"must be a gateway to multiple options";* high schools had a broader mission than college preparation or even academic preparation. However, Rosenbaum (2002) claimed that American high schools had quietly adopted a new informal policy that he termed *"college-for-all."*   He recommended policy actions to invigorate career technical programs. The issue was not *if* public schools should be engaged in preparing students with academics and for work, community, and family—but rather *how* (Pucel 2001).

Southern Regional Education Board (SREB) Goals for Education

The SREB issued a report, *Goals for Education: Challenge to Lead* (SREB 2002), in which it called for all recent high school graduates to have solid academic preparation and be ready for postsecondary education and a career. In response to the question, "How do you know if your state's high school graduates are prepared for college and work?" the SREB recommended the following:

- All students complete a core of college preparatory course (in language arts, mathematics, science, and social studies), pass end-of-course tests, and—
    o successfully complete additional academic courses, end-of-course tests, and college admission examinations

      or

    o successfully complete a series of career technical courses and pass end-of-program and workplace examinations.

The report stated, "*Many students also need a well-crafted sequence of technical or career courses, backed by solid end-of-program and workplace examinations.*" Technical literacy requires high-level English, math and science. The report told schools that if they didn't remove the low-level courses in the 1990s they should remove them now. This policy was adopted by high schools in the High Schools That Work (HSTW) network that operates under the auspices of SREB.

Michigan's Career Preparation System

In *Michigan*, one of the goals of the *Career Preparation System* is to ensure that career preparation is fully integrated into the Michigan educational system. It is suggested that career preparation system information be included in school accountability systems and that career preparation system planners be represented on school improvement teams.

The Secondary CTE Policy Debate

Policymakers and national and state CTE leaders espouse a CTE mission of preparing students for both work and continued education. However, those aims can be competing. Career technical educators must be clear about the *ends* for programs. F. Scott Fitzgerald observed, *"The test of a first-rate intelligence is the ability to hold in mind two competing points of view and still retain the ability to function."* That is indeed the challenge to career technical educators—to design and implement programs that meet both *ends*.

> ***The test of a first-rate intelligence is the ability to hold in mind two competing points of view and still retain the ability to function.***
>
> *F. Scott Fitzgerald*

Stone (2000) described the competing views of CTE:

> *Some voices argue that it's strictly a postsecondary activity; others argue it rightly belongs in secondary schools as well. Some argue that we conceptualize vocational education too narrowly (work emphasis) and ignore other vocations (in life, family, and community, for example). Some argue that it is only a method and has no real content integrity (especially in the K-12 context). Some argue that it's only for "those" kids.* (p. 89)

Lynch (2000) said that vocational education in high schools was at a crossroads:

> *Down one path seems to be successful programs that are technologically up to date, integrate rigorous academics with knowledge and skills needed for careers, have a good career pathway planned with and for students and their parents, prepare students concomitantly for employment and higher education, and are well respected in the community. Many such programs are shining examples of excellence and some have been showcased in many ways.*

Down another path are schools and programs that have failed to update and increasingly rely on larger percentages of their total enrollment from disadvantaged populations but may not be well staffed or equipped to serve special populations well. . . . Sadly many high school vocational programs are actually isolated from the workplaces for which they are allegedly preparing students. (p. 16)

The labor market also demands higher-level academic skills. The evidence suggests that postsecondary education is required for most new jobs and for good wages.

In a statement accompanying the President's 2004 budget, Assistant Secretary of the Office of Vocational and Adult Education Carol D'Amico (2003) said that traditional vocational programs do not offer the academic or technical rigor to adequately prepare students for the demands of postsecondary education or the high-skilled workplace.

NAVE Interim Report

The NAVE interim report (Silverberg et al. 2002) interim report stated that legislative changes had broadened rather than clarified the goals of vocational education. The NAVE interim report cited these issues as unresolved:

- How essential is vocational education at the secondary level?
- Who is secondary vocational education for and what is its purpose?
- Should vocational education be "education" or "training"?
- What is the best way to help special populations?

While Perkins III specified outcomes for vocational education, it did not prioritize them.

The NAVE independent panel (Silverberg et al. 2002) said in its cover letter to Congress:

Whereas all students should be well prepared academically and have the opportunity to pursue a bachelor's degree or other postsecondary training, it is important to recognize that two-thirds of America's young people do not obtain a four-year college degree and at least 25 percent go to work directly after high school. The reality is that most young people must draw on skills learned outside of four-year colleges to succeed in the workforce. That's where good career technical education at secondary schools and community and technical colleges comes in.

Mission of CTE

Four Options

In a paper commissioned by the U.S. Department of Education, Gray (2002) described four main schools of thought regarding the best role for high school CTE:

1. To provide an occupational sequence of courses that is *integrated* with rigorous academic course work as preparation for postsecondary pre-baccalaureate technical education or full-time employment. This is the role outlined by federal legislation.

2. To provide an occupational sequence of courses designed solely to prepare students for the transition from high school to full-time employment. This is the traditional role of vocational education.

3. To retain CTE not as a sequential occupational program of study but as unique courses or as a strategy that provides an applied context for teaching academics.

4. Eliminate CTE in favor of a common academic program for all students.

Most policymakers and educators support the first, CTE integrated with rigorous academic course work, as a viable approach. Given the necessity of some form of postsecondary education or training for today's high-skill, high-wage jobs, there are few proponents of the second option—CTE primarily as preparation for entry-level work. The third option has some advocates, such as Grubb (described below). While there has been pressure on the CTE curriculum from the academic standards and accountability movement, CTE has maintained its presence. This is due primarily to the fact that students are taking more courses for graduation, thus adding academic courses and retaining the same level of CTE course taking. So it may be argued that in practice there are few proponents of the fourth option.

Using National Center for Education Statistics (NCES) 1998 transcript data, Table 3 (Gray 2002) shows the percentage distribution of students among four CTE curriculum options.

Table 3
Percentage Distribution of Students among Four CTE Curriculum Options

	Entire Sample	CTE Curriculum Options			
		Academic	Integrated CTE/Academic	Traditional CTE	Neither
1998		70%	20%	4%	6%
Male	44%	44%	53%	66%	46%
Female	56%	56%	47%	34%	54%
White	59%	60%	58%	51%	48%
Black	18%	12%	22%	9%	17%
Hispanic	14%	13%	13%	10%	27%
Other	9%	10%	7%	30%	8%
Source: Gray (2002).					

Table 4 shows the academic requirements for four curriculum tracks.

Table 4
Academic Requirements by Curriculum Track

Curriculum Track	English: 4 courses	Social studies: 3 classes	Math: 3 classes	Science: 3 classes	CTE: 3 courses in single labor market area
Academic	Yes	Yes	Yes	Yes	No
Integrated	Yes	Yes	Yes	Yes	Yes
Traditional CTE	No	No	No	No	Yes
Neither	No	No	No	No	No

Gray also concluded that the major difference in course-taking patterns of academic and integrated CTE/academic students was that the former were much more likely to take a foreign language. On average, high school students took three courses of CTE. This number declined only slightly during the 1990s. Transcript data indicated that CTE course taking was significant, suggesting that one-fifth of all high school course work was in CTE.

New Vocationalism

Grubb (1996) posited the theory of the new vocationalism as integrated instruction organized around broadly defined occupations—or a combination of occupations, social problems, and other engaging topics. His theory reflects the third option in Gray's framework. What Grubb proposed is *broadened occupational content* (e.g., health, business), *integrated with traditional academic subjects* (e.g., reading, writing, math), *using new institutional structures* (career pathways, majors, academies) and *other elements of school-to-work programs* (i.e., work-based learning, connecting activities, and alternative pedagogies.)

Grubb (1995) revisited the work of John Dewey on education through occupations. He supported career clusters as a means to organize vocational curricula. He suggested that the advantages included (1) a more general approach to curriculum design; (2) inclusion of a greater variety and breadth of academic content in vocational courses; (3) greater appeal to a broad range of students; (4) the need to provide broad instruction about all aspects of an industry; (5) enhanced career guidance programs; and (6) reliance on work-based learning experiences developed with broad representation of the local business community.

Grubb (1995) decried the disconnect between the world of school and life after and outside of school. As well, he noted the motivational problems that come from the domination of academic instruction without any context or purpose from outside the school. Grubb said the occupational focus in high schools *"has the advantage of acknowledging the central occupational purpose of schooling and the crucial role of work in the lives of adults, rather than obfuscating vocational purposes behind an academic facade."*

Grubb (1997) further argued that "*education through occupations*" should provide a strong alternative to the conventional academic track. Grubb believed that what he suggested provided a middle ground that avoided the false dichotomy of choosing between academic and vocational education. He also suggested that the way to integrate academic and vocational education was not through theory or research but through practice.

It should be noted that Grubb's view is controversial among some career technical educators. Recognizing the importance of integrating academic and technical education, career technical educators want to be clear that there is value in obtaining technical skills and that career technical education should be more than a strategy for enhancing academic instruction.

Copa and Plihal (1996) described CTE as a broad field of study that emphasized the study of work, family, and community as a composite of vocational roles and responsibilities.

Lynch (2000), in a paper commissioned by the United States Department of Education, said that the purpose of high school career and technical education should be the following:

- Provide career exploration and planning
- Enhance academic achievement and motivation to learn more
- Acquire generic work competencies and skills useful for employment
- Establish pathways for continuing education and lifelong learning.

Based on second-year findings of an on-going longitudinal study of CTE and comprehensive school reforms in high schools (Castellano et al. 2002), researchers concluded that one of the keys of comprehensive reform was relevance, which helped keep students in school and interested. They said that focusing on career opportunities or special interests was one way to make education relevant.

> *Thus, it seems that the combination of career technical education with rigorous academics for all students is a reform model worth considering. Together, these efforts can address the need that all students have for a solid academic education, as well as for preparation for adult life, including work.* (p. 6)

U.S. Department of Education Statement

The Office of Vocational and Adult Education (D'Amico 2003) identified four program goals in a proposal for The Secondary and Technical Education Excellence Act of 2003:

- Increase the number of students taking a rigorous academic curriculum so they are fully prepared for college without needing remediation and high-skilled entry-level employment.
- Increase the high school graduation rate.
- Increase student choice among rigorous high school programs.
- Reduce the need for postsecondary remediation among recent high school graduates.

State Mission Statements

Based on a study of highly visionary companies, Collins and Porras (1994) concluded that the critical issue was *"not whether a company has the 'right' core ideology or a 'likable' core ideology, but rather that it* has *a core ideology— likeable or not—that gives guidance and inspiration to people inside that company."*   In the context of a CTE delivery system for Arizona, the mission or core ideology must give guidance and inspiration to all of the stakeholders at the state and local levels who implement the mission.

> ***What's important is a core ideology that gives guidance and inspiration to people inside that company****.*
>
> *J. Collins & J. Porras in* Built to Last

The framework for CTE instruction in Arizona is based upon preparing students for transition from school to careers. According to *The Handbook: Secondary Career and Technical Education Resource Handbook for CTE Administrators* (ADE, CTED 2001), there is a need for more emphasis on students' acquiring a strong foundation in academic and technical skills. Vocational education programs were restructured into an instructional sequence consisting of four levels. Courses in each level focus on developing decision-making skills, technology skills, workplace skills, and occupational skills.

Examples of state CTE mission or definitional statements follow:

- ***Idaho.*** To provide Idaho's youth and adults with technical skills, knowledge, and attitudes necessary for successful performance in a highly effective workplace.
- ***Maryland.*** To increase the academic, career, and technical skills of students in order to prepare them for careers and further education.
- ***Nebraska.*** To develop the capacity of individuals to be productive and successful in their work, family and community.
- ***New Mexico.*** Vocational technical education [Career technical education] is an organized education program that offers a sequence of courses, providing individuals with the academic knowledge and skills needed to prepare for future education and careers in current or emerging occupations.
- ***Texas.*** The mission of Career and Technology Education in Texas is to prepare young people to manage the dual roles of family member and wage earner, and to enable them to gain entry-level employment in a high-skill, high-wage job and/or to continue their education.
- ***Utah.*** The mission of applied technology education is to provide all students a seamless education system, driven by a Student Education Occupation Plan (SEOP), through competency-based instruction,

culminating in essential life skills, certified occupational skills, and meaningful employment.

- ***Washington.*** Career and Technical Education is a planned program of courses and learning experiences that begins with exploration of career options, supports basic academic and life skills, enables achievement of high academic standards, leadership, preparation for industry-defined work, and advanced and continuing education.

Summary

The linkage of secondary CTE with the purpose of high school is highlighted in the first part of the chapter. The second section describes the policy debate regarding the mission of CTE, the current United States Department of Education position, and examples of state CTE mission statements. The summary statement for the current Administration's legislative platform says (D'Amico 2003):

> *The simple and challenging vision of the proposed Secondary and Technical Education Excellence program is that every youth will complete high school with the academic knowledge and skills needed to make a successful transition to postsecondary education or training without needing remediation.*

Most policymakers and educators recognize the need for some level of postsecondary education for most jobs and support the mission of CTE to prepare students for work and continued education. A critical assumption is that academic skills alone are not enough to guarantee a good career. The CTE Division in Arizona is advised to assemble stakeholders and engage in a process to develop a shared mission for CTE and to communicate that mission throughout the state.

Chapter 4

Standards, Curriculum and Instruction for Career and Technical Education Systems

The essential questions for this chapter are two:

- *What should be the standards for CTE curriculum and instruction?*
- *How should standards be determined?*

Forty-seven states have created standards for student learning. Many have also adopted curriculum frameworks to guide instruction and new assessments to test students' knowledge (Darling-Hammond 2003). The standards movement, however, is beset with a definitional problem---that is, there is no "*standard*" standard, but an often-confusing variety of standards. Further, there are inconsistencies in the form, content, and specificity of standards (Wonacott 2000).

Three Types of Standards

CTE encompasses three types of standards: academic, technical, and employability (or workplace readiness). The academic standards for career technical education are those related to the technical field and are in addition to specific high school graduation requirements. Most states, as Arizona, have developed a crosswalk of their state academic standards to their CTE programs.

Employability or workplace readiness lists include communication skills, interpersonal and social skills, organization and planning skills, problem-solving skills, creative thinking, literacy, and technology skills (Lankard 2002). These lists generally reflect the Secretary's Commission on Achieving Necessary Skills (1991), commonly referred to as the SCANS skills. The three-part foundation for SCANS include the following:

- **Basic skills.** Reads, writes, performs arithmetic and mathematical operations, listens and speaks
- **Thinking skills.** Thinks creatively, makes decisions, solves problems, visualizes, knows how to learn, and reasons
- **Personal qualities.** Displays responsibility, self-esteem, sociability, self-management, and integrity and honesty

The five workplace competencies are as follows:

- **Resources.** Identifies, organizes, plans, and allocates resources
- **Interpersonal.** Works with others
- **Information.** Acquires and uses information
- **Systems.** Understands complex inter-relationships
- **Technology.** Works with a variety of technologies

Canada, Australia, and the United Kingdom have similar programs to address employability or generic skill development. Technical standards are primarily derived from industry skill standards and are validated with business and industry groups.

The National Dissemination Center for Career and Technical Education maintains a repository for academic standards, skill standards developed by various industry, professional and education associations, and employability standards.

Figure 2 illustrates technical literacy at the intersect of the three types of standards. Technical literacy is defined by HSTW as the ability to do the following:

- Read, understand, and communicate in the language of a career field
- Understand technical concepts and principles
- Use academic knowledge and skills to solve problems
- Use basic technology

Figure 2
Technical Literacy

jk
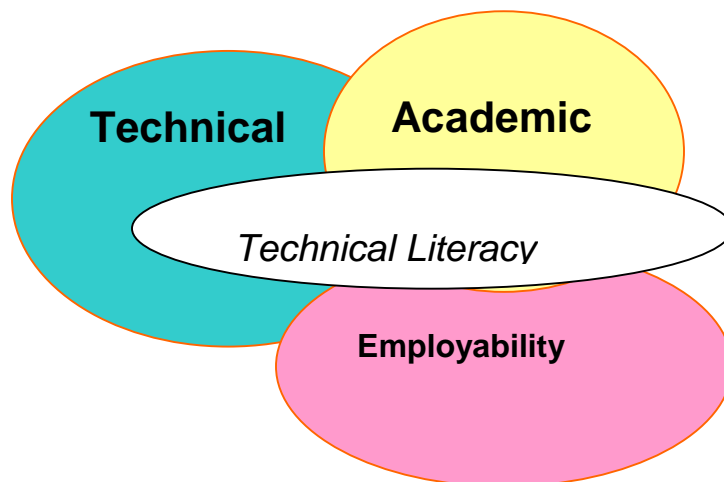
Arizona Business and Industry Survey

An online survey was mailed to members of state CTE program advisory committees and members of the Governor's Workforce Policy Board to determine a business perspective of the needs for the CTE system. (See Appendix C for survey instrument). The survey asked respondents to rate high school career technical high school graduates on the extent to which students are prepared in basic skills, academic skills, and technical skills. The rating scale was from 1 to 10, with 10 being high. Respondents rated the skill areas as shown in Table 5:

Table 5
Arizona Business Survey

n=16

Skill areas	Average rating Scale 1 – 10 (10=highly prepared)
Academic (basic)	5.81
Technical	5.27
Employability	5.72

Respondents rated students' skills in all three skill areas as just slightly above the mid-point of the scale, with academic skills the highest and technical skills the lowest. Business and industry survey respondents made the following observations:

Academic Skills

- *I believe all students in this state need to be better prepared in the basics.*
- *This varies in Arizona based on the school system in which the student is enrolled.*
- *There are dramatic differences that exist within the state.*
- *We get a large number of applicants for our entry-level jobs. Only approximately 20% of those applicants make the initial application screening based on their ability to write and complete the application appropriately.*
- *Given the increasing sophistication of the skills required in the workforce, far too many students are leaving high school without adequate math and science skills. Biotechnology, manufacturing, IT, etc. all are requiring*

better skills so that basic foundation knowledge aids a person in transferring their knowledge to new technologies, new skills requirements, etc.

Technical Skills

- *They don't get enough exposure to real life situations.*
- *The State of Arizona has some programs that provide this type of training via internships with companies. To my knowledge it does not have programs that provide students the option of obtaining training via vo-tech schools during a students' high school years.*
- *More and more high school districts are eliminating or substantially reducing their career technical education programs due to high costs and increasing time demands on other academic studies. Students leave high school with a very limited view or with very little information about various careers and options.*
- *Help students gain the needed technical expertise combined with a solid understanding of business principles and how they apply to everyday work.*
- *Many applicants do not possess basic computer skills that are required in most jobs today.*
- *Those students who we employ usually have excellent computer skills and many times help us when we have problems.*
- *If they have had training in a specific field - they have usually selected this field and selected it due to an interest- thereby, they perform above average in this area.*
- *Basic nursing skills (Certified Nurse Assisting) above average.*

Employability

- *Again, they are more qualified than those who have not had any exposure in this area.*
- *Many students have poor work ethic, attendance, reliability*
- *Students do very well in teamwork, but they do poorly in work ethic, problem solving. They need more opportunities to be in a work situation and learn problem solving through real life.*
- *Work on employability skills as well as training that keep up with the ever-changing needs of the marketplace.*
- *Unfortunately, this is one of the highest areas our employer community is complaining about and asking for assistance in. The issue of assessing a person's "soft skills" and determining what skills gaps exist is one of the areas our colleges are beginning to spend a great deal of time on.*
- *Many young people are willing and motivated to work. Many lack training and understanding that would help them be successful in the workplace initially. Internal mentorship programs have been successful with young adults willing and wanting to work and have a career.*

The survey also asked in which of the three skill areas CTE should place more emphasis:

- 31.2 percent said academic skills
- 25.0 percent said technical skills
- 43.7 percent said employability skills

Washington Survey of Employers

Every two years the Workforce Training and Education Board in *Washington* (2003) conducts a massive survey of *Washington* employers about their job training needs. Among employers who mostly hire at the high school level, the type of skills that employers report difficulty finding more than any other skills are job specific skills. The second most common skill deficits are in general workplace skills such as problem solving, work habits, and communications. Far fewer employers in that study report much difficulty finding workers with the basic academic skills of math, writing, or reading.

Power Standards for Instruction

A useful model that Arizona may wish to explore in implementing standards-based instruction in the classroom is that of "power standards." Teachers presented with lengthy lists of standards are daunted by the task of "coverage of material." Some scholars suggest that most states would require school years almost double their present length in order to adequately cover existing standards. Reeves at the Center for Performance Assessment (2002) recommends that instructors develop power standards that are fewer in number, more general in scope, and the most essential for their courses. Three questions guide the choice of standards:

- What endures over time? What skills and knowledge will students gain that they will need throughout their career?
- What is essential for progress to the next level?
- What contributes to understanding of other standards? This includes those standards that give a student the ability to use reasoning and thinking skills to learn and understand other curriculum objectives. The technical literacy standards meet these criteria for power standards.

States Career Clusters Initiative

CTE is increasingly being organized at both the state and school levels by career clusters. Career clusters are a means to broaden the focus of secondary CTE.

A career cluster is a grouping of occupations and broad industries based on commonalities.

The national career cluster project began as a combined effort of the School-to-Work Office and the Office of Vocational and Adult Education (OVAE). Each cluster had an advisory committee that included representatives from business and industry, associations, government agencies and secondary and postsecondary educators. Membership was broad-based geographically and reflected occupations within each of the pathways. Credentials, including licenses, certificates, and degrees, when applicable, were used as resources in the development of knowledge and skill components.

The state directors (NASDCTEc) provided leadership for the second phase of the project. In the fall of 2002, states received a series of documents that contained knowledge and skill statements, performance elements, and measurement criteria for each of the 16 clusters. State directors are currently continuing development work on the project.

The 16 career clusters provide an organizing tool for schools, small learning communities, academies and magnet schools (SCCI 2002), as shown in Table 6.

Table 6
States Career Clusters Initiative

Career Cluster	Description
Agriculture, Food & Natural Resources	The production, processing, marketing, distribution, financing, and development of agricultural commodities and resources including food, fiber, wood products, natural resources, horticulture, and other plant and animal products/resources
Architecture & Construction	Careers in designing, planning, managing, building and maintaining the built environment
Arts, Audio/Video Technology & Communications	Designing, producing, exhibiting, performing, writing, and publishing multimedia content including visual and performing arts and design, journalism, and entertainment services
Business Management & Administration	Business Management and Administration careers encompass planning, organizing, directing and evaluating business functions essential to efficient and productive business operations. Business Management and Administration career opportunities are available in every sector of the economy.

Career Cluster	Description
Education & Training	Planning, managing and providing education and training services, and related learning support services
Finance	Planning, services for financial and investment planning, banking, insurance, and business financial management
Government & Public Administration	Executing governmental functions to include Governance; National Security; Foreign Service; Planning; Revenue and Taxation; Regulation; and Management and Administration at the local, state, and federal levels
Health Science	Planning, managing, and providing therapeutic services, diagnostic services, health informatics, support services, and biotechnology research and development
Hospitality & Tourism	Hospitality & Tourism encompasses the management, marketing and operations of restaurants and other foodservices, lodging, attractions, recreation events and travel related services
Human Services	Preparing individuals for employment in career pathways that relate to families and human needs
Information Technology	Building Linkages in IT Occupations Framework: For Entry Level, Technical, and Professional Careers Related to the Design, Development, Support and Management of Hardware, Software, Multimedia, and Systems Integration Services
Law, Public Safety & Security	Planning, managing, and providing legal, public safety, protective services and homeland security, including professional and technical support services
Manufacturing	Planning, managing and performing the processing of materials into intermediate or final products and related professional and technical support activities such as production planning and control, maintenance and manufacturing/process engineering
Marketing, Sales & Services	Planning, managing, and performing marketing activities to reach organizational objectives
Science, Technology, Engineering & Mathematics	Planning, managing, and providing scientific research and professional and technical services (e.g., physical science, social science, engineering) including laboratory and testing services, and research and development services
Transportation, Distribution, & Logistics	Planning, management, and movement of people, materials, and goods by road, pipeline, air, rail and water and related professional and technical support services such as transportation infrastructure planning and management, logistics services, mobile equipment and facility maintenance

Skill and knowledge statements are developed for each level of the 16 career clusters. Table 7 shows the framework for each of the clusters.

Table 7
Career Cluster Framework

Cluster Level	Represents the skill and knowledge, both academic and technical, that all students within the cluster should achieve regardless of their pathway
Pathway Level	Represents the skill and knowledge, both academic and technical, necessary to pursue a full range of career opportunities within a pathway - ranging from entry level to management, including technical and professional career specialties
Career Specialties	Represents the full range of career opportunities within each pathway

Cluster/Pathway Knowledge and Skill Components identify existing and/or establish the knowledge and skills common across the Cluster as well as each of the Pathways.

Cluster Level knowledge and skill topics include the following:

- Academic foundations
- Communications
- Problem solving and critical thinking
- Information technology applications
- Systems
- Safety, health, and environmental
- Leadership and teamwork
- Ethics and legal responsibilities
- Employability and career development
- Technical skills

Michigan's Career Preparation System

Michigan established a *Career Preparation System* as an integral part of the state's total educational system. One of the standards states that the participating education agency board of education will adopt academic learning in a career context as a teaching/learning strategy in the K-12 curriculum. The standard for career pathways states that the board will have adopted the approved six career pathways to provide the structure for making meaningful connections between education and the world of work. More than 80 percent of school districts in *Michigan* have used or intend to use all six pathways:

- Arts and communications
- Business, management, marketing and technology
- Engineering/manufacturing and industrial technology
- Health sciences
- Human services
- Natural resources and agriscience

A third standard relates to adoption of a comprehensive, planned and sequential program of career awareness and exploration activities.

Process for Determining State Curriculum

States vary considerably in their processes to determine and provide state curriculum. A few provide no direction. Others provide extensive curriculum resources.

In Arizona, the CTE Advisory Committee recommendations that were approved by the State Board on September 25, 2000 included these three recommendations related to competencies and standards:

- **Provide for the regular review and updating of program competencies.** The Division reports (July 15, 2002) that they have created a position and hired a full-time curriculum specialist. This position is responsible for the process of adopting/adapting new curriculum including acceptable vocational assessment instruments for the FY 2002 CTE Program List.

- **Whenever possible, align with and utilize current industry competency standards.** Two programs, Business Information Technology Services and Business Management and Supervision, are piloting new curriculum for FY 2003. The process has been revised to insure and include current industry-validated competency standards in all curricula.

- **Include all Arizona academic standards (including workplace standards) in the State AIMS assessment.** The Division states that State Board action is required.

The Arizona Department of Education, CTE Division, commissioned a study to (1) research and develop a curriculum design and/or adoption process and (2) to prepare guidelines for a recommended format for future curriculum material (Norris & Croft 2001). The overview to the new *Arizona Automotive Technologies Curriculum Framework (2002)* describes the new strategies used based on the curriculum study. These strategies include the following:

- Identifying national industry skill standards
- Identifying industry-recognized assessments/certificates (local and national)
- Developing a design team consisting of a significant majority of industry representation
- Reviewing other nationally recognized states' CTE program competencies/frameworks
- Adapting/adopting existing program competencies
- Soliciting industry and education representative feedback to validate all the components of the curriculum framework
- Increasing academic rigor by applying higher order skills to program competencies/indicators
- Applying Arizona academic standards to program competencies and identifying appropriate performance objectives that support improved academic attainment

Arizona's CTE Level III programs use a continuous improvement model as the curriculum process is refined and resources are developed. Educators provide feedback and industry revalidates the curriculum framework components. The CTE website is intended to provide a means for updating and publicizing the frameworks.

Integrated Instruction

Improving student achievement requires instruction aligned with standards. The *Breaking Ranks* report (NSSP 1996) recommends that the content of the curriculum, where practical, will connect itself to real-life applications of knowledge and skills to help students link their education to the future.

*California (*2002), in a publication for improving high schools, *Aiming High*, says "*to focus only on core academic content standards would shortchange the mission of most high schools in the state: to prepare students to become productive and responsible citizens of the global community."* They suggest that offerings such as CTE courses and the visual and performing arts can increase both attendance and graduation rates as well as help prepare students for careers. *California* also states that efforts are underway to identify academic content standards in each of 15 industry sectors to assist schools in offering academic rigor and relevance while preparing students for future employment.

Michigan's Career Preparation System emphasizes "*career contextual learning"* which they define as learning academics in a career context using authentic workplace applications and expectations to make learning more relevant, improve student academic achievement, and create greater awareness of career options. They note that the purpose is to be additive to the academic standards.

HSTW data have consistently shown that students who experience integrated academic and technical content in their career technical classes achieve at a higher level than students who do not. According to Bottoms (2002), teachers in classrooms with high-achieving students do the following:

- Place a great deal of importance on assignments that require students to read, write, and use mathematics
- Require students to use mathematics, read technical manuals and books, and use computers daily or weekly in completing career technical assignments

Figure 2 illustrates the impact on student achievement of career technical courses that integrate academic content and skills. The percentages refer to the students who met the HSTW performance goals on the National Assessment of Student Progress-based 2000 assessment.

Figure 3
Reading, Mathematics, and Science NAEP Scores for Integrated Instruction

Reading, Mathematics, and Science NAEP Scores for Students When Academics and Vocational Instruction Integrated
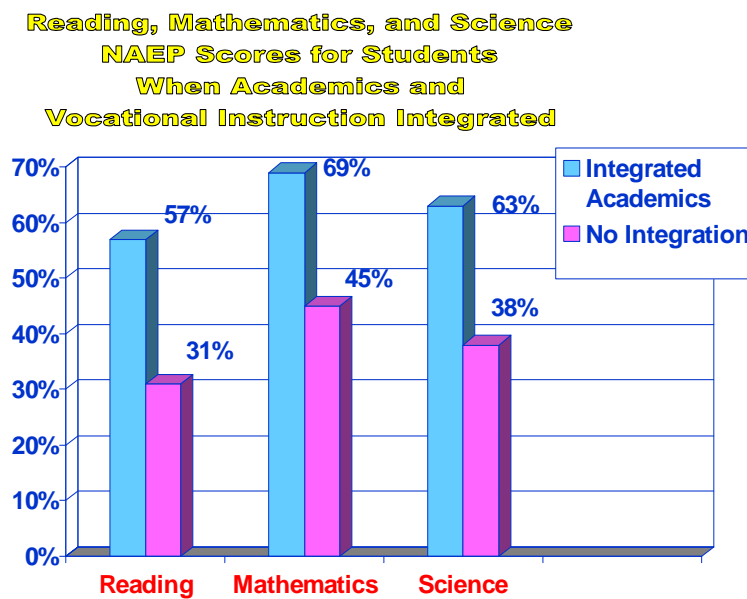
Hoachlander (1999) suggests that integration is difficult but worth the effort because it improves student achievement, especially for those who have not fared well in the traditional curriculum. He proposes four forms of integration that are progressively more complex to implement. Each has merit.

1. Course level integration in which changes are made by individual teachers

2. Cross-curriculum integration in which teachers do not necessarily change what they teach, but the timing of the required academic and career technical content

3. Programmatic integration through career clusters and industry majors in which teachers may introduce more generic industry based knowledge into the program's content

4. School wide integration through academies and other models in which an academy or entire school is organized around a major industry or career area

Traditional teacher training and staff development pose a barrier to widespread adoption of instruction that integrates academic and CTE (Stasz et al. 1992). The research notes that teachers are generally trained in writing behavioral objectives, lesson plans, and worksheets, and that most staff development is related to curriculum frameworks, not instruction. They describe a teacher preparation institution that had never heard of curricular integration despite the fact that integration of academic and vocational education was a statewide reform mandated by the State Department of Education in that state. According to Stasz, teachers were unprepared to design classroom activities that integrate academic and technical skills or situate learning in a work context.

Summary

CTE delivers on three types of standards: academic, technical, and employability. Based on national studies and the survey of Arizona business and industry representatives for this study, CTE should emphasize employability standards more strongly. Given the increased skill requirements for work, young people will be better prepared if they have an understanding of the technical literacy requirements—the scientific, mathematical, technical language of the field as well as the technical skills.

The second section addresses the States Career Cluster Initiative that is being used in the design and delivery of CTE curriculum across the country. It is recommended that the CTE Division in Arizona utilize this work in the development of their curriculum frameworks.

The chapter addresses integrated academic and technical and contextual instruction. Most educational theorists and practitioners agree that curriculum integration should be a priority and acknowledge that staff development is key. Two resources for integrated instruction are the HSTW network and the Center for Occupational Research and Development (CORD).

Chapter 5
Accountability and Technical Assessments
For Career Technical Education Systems

Chapter 5 addresses two essential questions:
- *What are recommendations for state accountability systems for CTE?*
- *How should CTE programs be assessed?*

Accountability Systems

In a report for state CTE leaders, Bottoms & Makin (1998) recommended eight guiding principles for aligning CTE with accountability initiatives:

1. Make continuous improvement in academic and career technical content the primary focus.

2. Set student achievement standards high enough for students to succeed after high school. They must be high enough so that students can pass employers' qualifying exams and avoid remedial courses at community and technical colleges.

3. Focus on things that matter in improving student achievement. State leaders are encouraged to focus on the percentage of students (a) completing an upgraded academic core; (b) completing a career concentration; and (c) meeting achievement goals (HSTW) in reading, mathematics and science.

4. Create a data collection and reporting process that links school and classroom practices with student achievement and tells local school leaders which practices are working and which are not.

5. Make business/industry and postsecondary leaders partners with educators in implementing reform.

6. Conduct on-site technical assistance visits to (a) identify best practices; (b) determine and justify major challenges the school must address to increase student achievement; (c) identify actions the school can take to address the challenges; and (d) present the findings to teachers and administrators.

7. Help schools use data and information effectively.

8. Improve and expand the use of technical literacy tests that require understanding and application of concepts and skills in a career concentration. Make the tests "high-stakes" tests for students and teachers.

Stevens (2001) describes basic criteria for high-quality outcome based performance measurement including a clear goal statement.   He notes that different customers have different goals and needs for performance information.

Valid and reliable measurements are key. Agreement on indicators, lags in the availability of some performance information, an absence of benchmark data, and cost and administrative burden of establishing and maintaining longitudinal files limit the practical feasibility of adopting some preferred valid indicators of performance. Stevens cautions that changes in the definitions or quality of performance information drives a wedge between the before and after measurement values.

Stevens notes that there is an "understandable reluctance" to base funding allocation decisions on quantitative evidence of outcomes-based performance—primarily because the core indicator framework is meager. He cites *Florida* as having taken a bold approach to performance-based funding of some components of the state's education programs and that they are experiencing tension in that process.

The challenge is to connect reliable measures of program activities to reliable indicators of performance. Stevens (2001) identifies two International Organization for Standardization (ISO) quality principles and two criteria from the Baldrige National Quality Program *Education Criteria for Performance Excellence).*

ISO Principles

1. **Continual improvement.** Employing a consistent organization-wide approach to continual improvement of the organization's performance; providing people with training in the methods and tools of continual improvement; making continual improvement of products, processes, and systems an objective for every individual in the organization; establishing goals to guide and measures to track continual improvement; and recognizing and acknowledging improvements.

2. **A factual approach to decision making.** Ensuring the data and information are sufficiently accurate and reliable; making data accessible to those who need it; analyzing data and information using valid methods; and making decisions and taking action based on factual analysis,

balanced with experience and intuition. The remaining six ISO quality management principles are customer focus, leadership, involvement of people, process approach, system approach to management, and mutually beneficial supplier relationships.

Baldrige Criteria

1. **Information and analysis**. Examining an organization's performance measurement system and how the organization analyzes performance data and information. This includes the selection of indicators and evidence of their use and effectiveness in daily operations, information reliability, an understanding of improvement options, projections of data to support planning and steps taken to keep the performance measurement system current with service needs and directions.

2. **Student performance results**. Segmented by student groups as appropriate, and including appropriate data relative to comparable organizations and student populations. The question to be answered is: What are your current levels and trends in key measures and/or indicators of student performance?

A number of states are using Baldrige Education Criteria (2003) for state and local CTE systems. The remaining five Baldrige education criteria for judging performance excellence are leadership, strategic planning, student and stakeholder focus, faculty and staff focus, and educational and support process management. The Baldrige Criteria for Performance Excellence provide a framework for improvement without being prescriptive.

Arizona's accountability system (ADE 2000) is guided by three principles that are consistent with those outlined by Stevens. The principles are as follows:

- **Systems thinking.** How work contributes to the organization; using data effectively; and understanding key practices that affect performance
- **Management by data.** Decisions based on valid and reliable data; program assessment strategy; objective criteria; outcomes related to practices and inputs; access to reliable data early in the teaching and learning process
- **Continuous improvement.** Stabilized well-defined system; emphasis of effective design of programs, curricula and learning environment for the student and faculty

The High Schools That Work (HSTW) assessment system is unique in linking student achievement in reading, mathematics, and science to academic and career technical classroom experiences, course-taking patterns and school climate and expectations. Data are triangulated through a National Assessment of Educational Progress-based (NAEP) assessment administered to seniors,

teacher surveys, transcript studies and student surveys. School leaders and staff use the information to revise instruction, graduation requirements, curricula, guidance practices, school and classroom expectations, extra-help systems and work-based learning programs.

State Core Indicators

Perkins III (1998 Section 113) requires States to identify in their State plan core indicators of performance that include, at a minimum, measures of each of the following:

- Student attainment of challenging State established academic and vocational and technical, skill proficiencies
- Student attainment of a secondary school diploma or its recognized equivalent, a proficiency credential in conjunction with a secondary school diploma, or a postsecondary degree or credential
- Placement in, retention in, and completion of, postsecondary education or advanced training, placement in military service, or placement or retention in employment
- Student participation in and completion of vocational and technical education programs that lead to nontraditional training and employment

An eligible agency, with input from eligible recipients, may identify in the State plan additional indicators of performance for vocational and technical education activities authorized under the title.

Industry Certifications

Certificates are one of the most common forms of non-degreed credentials. Skill certificates are becoming increasingly accepted in the workplace. Certification is a process whereby a governmental or non-governmental organization recognizes an individual meeting predetermined qualifications by a certification body (Mahlman, Austin, & Jeong 2002).

The National Skill Standards Board (NSSB 2001) distinguishes between *skill standards* and *occupational certifications*. *Skill standards* are defined as "*performance specifications that identify the knowledge, skills, and abilities an individual needs to succeed in the workplace.*" They delineate what a person must know and be able to do in order to perform related work successfully at a specific job within an occupational cluster, or across an industry sector.

Occupational certifications are self-contained, end-result processes by which the mastery of predetermined knowledge and skill competencies is demonstrated through appropriate assessment protocols, and affirmed through the award of

related credentials. In addition, "*core*" and "*concentration*" certification programs are being developed by NSSB.

Certifications provide impartial, third party verification of a person's knowledge/skill qualifications to work at a specific job, within an occupational cluster, or across an industry sector. These certifications are awarded by vendors or professional, industry, or trade associations after individuals pass a standards-based examination.

Licensure is often referred to as "practice control." A person cannot legally perform the occupation without the appropriate license. The most restrictive form of regulation, the primary purpose is the protection of the public (Mahlman, Austin, & Jeong 2002).

Rationale

According to NSSB (2001), nationally recognized, industry-based and industry-validated skill standards and occupational certifications promote the following key returns on investment:

- Certificate portability
- Skill transferability
- Worker mobility
- Education and training consistency

Criteria for Industry Certifications

Mahlman, Austin, & Jeong (2002) identified these selection criteria:

- **Marketability.** If related to an increased preference in hiring and an increase in wages, marketability is greater.
- **Recognition.** If accepted by many hiring organizations and across a wide geographical area, recognition is greater.
- **Alignment with curriculum.** More match between content measured by the certification test(s) and content of the curriculum, together with less contamination, means alignment is greater.
- **Quality of standards.** Appropriateness of the standards upon which the certification is based: How were they developed? Are they current? Validated?
- **Quality of assessments.** Appropriateness of assessments on which certification decisions are made? Are they reliable, valid, fair?
- **Usability in CTE setting.** Such system features as assessment cost, timing, availability of test results to educators/administrators, and data format.

A certification may be of high quality, valid, and marketable but unusable for assessment of student achievement or for the collection of accountability data. Other criteria to consider are cost and timing of the assessment, availability of test results to educational institutions, and data format. Does the certification reflect national and state sources? Is the provider regulated or unregulated? Does it require independent or third-party validation?

Virginia uses the following criteria for approving industry certification exams for CTE programs:

- Standardized and graded independent of the school in which the test is given
- Knowledge-based, as opposed to performance-based
- Administered on a multi-state or international basis
- In a CTE concentration or specialization that confers certification from a recognized industry, trade, or professional association

Virginia acknowledges that a major shortcoming is that only 22 percent of *Virginia* students are enrolled in courses with the potential for industry certification.

The current credentialing and certification system is fragmented, a labyrinth of for-profit and not-for-profit postsecondary institutions, professional, industry, and trade associations, commercial vendors, and government (Carnevale and Desrochers 2001). Vendor certificates are particularly prominent in the IT fields. More than 1,600 institutions and organizations are involved in certifying individuals along with approximately 200 accrediting bodies. Currently, the number of certification-offering organizations is estimated to be over 2,000 (Mahlman, Austin, & Jeong 2002).

End-of-Program Technical Assessments

A good accountability system does more than audit performance. It must be used to improve performance. Career technical testing is critical to improving and documenting achievement in career technical programs.

> *As a result of the standards and accountability efforts in the past couple of decades, states have documented considerable progress in academic achievement. However, it is still problematic to find evidence of career technical achievement (Kister 2001).*

The purpose of technical assessments is to improve instruction, adjust curriculum, raise expectations and align the curriculum with state and national standards (Bottoms & Makin 1998). Other reasons include the following:

- To inform the public about the quality of a school's career technical program
- To provide a "high-stakes" exam for students and schools
- To award credit for advanced placement in a postsecondary career technical program
- To demonstrate to employers that graduates possess technical literacy skills in a career field

Bottoms & Makin (1998) defined technical literacy as the ability to (1) apply academic knowledge and skill to a broad field of technical studies; (2) read, understand, and communicate in the language of the technical field; (3) understand technical concepts and principles; and (4) use technology to complete projects in a specific career technical field. They identified the following indicators for the technical literacy exams:

- The percentage of seniors passing written technical literacy exams
- The percentage of seniors passing performance-based technical literacy exams
- The number of seniors completing industry-certified programs
- The number of employers waiving pre-employment technical literacy testing for students who pass state technical literacy exams
- The percentage of seniors meeting the standards of a quality senior project
- The percentage of students receiving advanced placement credit in an apprenticeship or postsecondary program of study

It must be remembered that tests are a means, not an end, in CTE program improvement.

National Occupational Competency Testing Institute

The major provider of CTE assessments is the National Occupational Competency Testing Institute (NOCTI), a state consortium. NOCTI assessments do the following:

- Provide a written and performance-based component
- May be given pre- and post, providing data on what was taught and learned.
- Can be used for comparisons at the classroom, district, state and national levels
- Are based on industry-validated standards
- Are linked to national academic and technical standards
- Are available in written form or on-line

States and districts that use NOCTI assessments receive customized score reports. Currently NOCTI is developing a workplace readiness assessment based on the national States Career Cluster foundation skills. NOCTI also administers the national health science career cluster assessment.

Several states have developed their own technical assessments that are administered at the end of program. These include *Arkansas, Kentucky, Mississippi, North Carolina, Ohio, Oklahoma, Utah* and *West Virginia.*

Some states, including *Pennsylvania* and *Connecticut*, use NOCTI exams, with statewide reporting, for their total state CTE assessment system. Several states, including *New York,* encourage local districts to use NOCTI assessments and use that data for state and Perkins accountability.

In states with technical assessment systems, students may receive certificates. In some cases, these certificates are recognized by employers.

Performance testing is important for CTE. Skills are best assessed through measuring the performance of tasks rather than through measuring the knowledge used in performing the tasks. NOCTI assessments include a performance component that is administered by external evaluators, primarily from business and industry.

Assessment is the critical element of a competency-based certification process (NSSB 2001).   All assessment methods, scoring techniques, and related outcomes should be valid, reliable, objective, unbiased, and criterion-referenced.

Criteria for Technical Assessments

In order to provide the data needed to improve instruction in CTE, tests should do the following (Kister 2001):

- Include measures of both technical knowledge and skills (based on industry-validated standards) and technical literacy aligned with state and national standards.
- Be designed to measure student progress against clear and rigorous technical and technical literacy standards.
- Meet criteria for quality assessments. Tests must meet standards set forth by organizations such as the American Education Research Association, the American Psychological Association, and National Council on Measurement in Education Standards for Educational and Psychological Testing. Tests must have these characteristics:

  o **Valid**. Does the test measure what it is supposed to?

- **Reliable.** Can the results be trusted? Will the results be consistent over time?
- **Fair and non-biased.** Does it not put members of different racial, ethnic, or gender groups at a disadvantage?
- **Secure.** Is the test secure at all sites?
- **Benchmarked.** Is the test benchmarked at the national, regional, state, and/or local levels?

Other criteria include assessment of higher levels of understanding and problem solving. Assessments should provide comprehensive content coverage. State and local districts are also concerned with cost and efficiency. On-line testing is proving to be a cost-effective delivery means.

Summary

Chapter 5 addresses the broader issue of state accountability systems and includes a set of guiding principles for aligning CTE with academic initiatives. The ISO and Baldrige principles of continuous improvement and using information are described.

The second part of the chapter focuses on assessment, specifically industrial certifications and end-of-program technical assessments. The CTE Division should review the criteria for industry certifications and technical assessments and consider adding certifications, where applicable, and technical assessments to its current accountability system. The purpose would be program accountability and improvement.

Chapter 6
Delivery System for Career Technical Education

> *Every system is designed to get the results it gets.*

This chapter will focus on the central question: *What should be the delivery system for CTE in Arizona?* Implicit in this question is the need to define a scope and sequence for CTE programs and the structures or organization for delivery.

System is defined in Arizona's Vocational Education Accountability System document (ADE 2000) as "*a group of interrelated components designed collectively to achieve a desired goal.*" Systems thinking involves understanding how a whole is expressed in terms of its parts and conversely, how the parts relate to each other and to the whole.

The delivery system for CTE includes the program of studies or scope and sequence and structures or how it is delivered. This chapter addresses criteria for a CTE delivery system and an in-depth analysis of issues and components of CTE scope and sequence and structures. The research question is: What program of studies or scope and sequence and what delivery structures are associated with student achievement of academic and technical skills?

Criteria for CTE Delivery System

The CTE Division needs to define a set of criteria to use in determining the scope and sequence and delivery system for CTE at the secondary level. The following may be considered.

Emphasis on a Broad, Long-Term Conception of Work

Hoachlander (1999) suggests that occupationally specific CTE should not be abandoned, but it should be provided in a larger context so that students can generalize learning, make connections between education and work, and adapt to changes in their jobs or careers. For viable long-term careers, students will need academic knowledge and technical information literacy skills to keep pace with change.

High Level of Rigor in Career Technical Instruction

The scope and sequence for CTE should provide opportunities for students to meet challenging career technical standards. Curriculum and instruction should require critical thinking and problem-solving skills.

The report from the National Commission on the High School Senior Year (2001) calls for high quality career programs that integrate academic standards with challenging technical content. The report also recommends that state and local educators should reshape the senior year to provide more learning opportunities of all kinds.

> *They should develop sound alternative paths (Advanced Placement, dual enrollment in secondary schools and postsecondary institutions, rigorous structured work experiences, and community service) to provide credit toward graduation for high school students and ease their transition from high school to postsecondary education and the world of work.* (p. 32)

Bottoms (2002) asserts that achievement is improved if states establish policies to make full use of the senior year of high school by requiring all students to complete a challenging academic core and either an academic or a career technical concentration of at least three or four credits.

Strengthened Academic Foundation

Many students need the relevance of learning and applying essential academic skills in a work-related context. In general, this is best done in broadly defined areas—science as applied to the entire health industry, for example, rather than to a specific occupation like dental assistant (Hoachlander 1998). Some states have adopted *Project Lead the Way* as a "pre-technology" pathway emphasizing science with engineering.

Strong Secondary-Postsecondary Connections

A lifetime of change will mean a lifetime of learning, often including formal postsecondary education. Broader CTE programs lend themselves better to a range of postsecondary options, including four-year options.

Elimination of Tracking

D'Amico (2003) says: "*High schools continue to track students, holding them back with the 'soft bigotry of low expectations,' and student achievement rates*

are at the same level as 30 years ago."

Lynch (2000) envisions all students selecting a major, thereby eliminating the tracking and labeling system that typically identifies students as college prep, general, vocational, and special education. He recommends the following criteria for organizing career technical majors:

- A mission to provide the foundation for long-term employment and lifelong learning
- High-growth employment industries and occupations that offer high wages, good career opportunities for graduates, and a clear pathway to advancement
- Requirements for a rigorous, coherent, sequenced program of study that includes high-level academics, technology applications, a recognized body of knowledge by industry standards, infusion of employability skills, work-based learning, and instruction in all aspects of the industry
- Connections with business and industry
- Connections with postsecondary education
- Recognition at key points (e.g. high school graduation) with a transcript delineating accomplishments and/or a skill certificate based on valid and reliable assessments

Hoachlander, Alt & Beltranena (2001) describe "tracking" in American schools as a pernicious and long-standing practice that combines low expectations with watered-down curriculum and uninspired teaching. It is

> *…the practice of separating students—often in strong association with race and socio-economic status—based on presumptions that some students are incapable of higher performance (a distinctly American supposition that achievement is primarily a function of ability) and therefore should be isolated from those who are more able (p.16).*

Hoachlander, Alt & Beltranena note while there are too many examples of low-level vocational curricula that prepare for dead-end, entry-level jobs, that more and more high schools have developed highly challenging and technically advanced "career majors." Both approaches to vocational education involve differentiation and grouping of students. The dilemma is when does sorting students promote high achievement for all students?

The authors say: "*This much does seem clear. Tracking that sorts students into less-demanding courses produces lower levels of achievement among those in the easier classes.*" The challenge is to create programs of instruction that do not rationalize low expectations based on students, but rather capitalize on those differences to promote higher levels of learning.

An equitable delivery system should ensure a relevant and effective high school education for all students: career bound, technical college bound, and four-year college bound. Gray (2002) says that those who argue that all students' time would be best spent taking academic course work, not CTE, are in fact arguing that a single academic curriculum provides both a relevant and effective education for all students.

Rosenbaum (2002) reported that in interviews, many low-achieving students report that they are "*unsuccessful, bored, withdrawn and rebellious in nearly all their classes, with only one exception—their vocational classes.*" He suggests that vocational classes give students a compelling reason to learn and to do high-quality work.

According to the *High School of the Millennium Report* (Brand & Partee 2000), high schools should not track students into any particular course or program. Rather, all students are expected to pursue a course of studies that leads to high academic achievement.

Improved Economic Outcomes

A comprehensive review of research on vocational education concludes *"the strongest, most consistent finding throughout the literature [on vocational education] is that improved earnings do accrue in situations where vocational training is directly related to job tasks."* Bishop (1989) has conducted several studies in which he has found a positive effect of secondary vocational education on wages for those employed in a job related to their field of study. Bishop says that the more relevant coursework an individual has, the higher the wages.

Bishop found that workers whose occupational skills were thought to be "*much better*" started with a 12 percent better wage and were making 14 percent extra after a year on the job. Academic skills had no significant effects on wage rates.

Bishop (1995) in a recent working paper notes that economists have long argued that the returns on general education are higher than those on specific training, because education is transferable whereas many skills tend to be job-specific. However, he says that while the case is becoming more compelling as the life cycle of vocational skills diminishes, it is based on three *false* premises:

> *All my life, I've always wanted to be somebody.*
> *But I see now I should have been more specific.*
> Lily Tomlin

- **Academic skills are a good substitute for occupation specific skills.** In a survey of the owners of small and medium size businesses that were members of the National Federation of Independent Business (NFIB) were asked, "Which abilities influence hiring selection the most?" Forty percent ranked "occupational skills" (already has them) first, and another 14 percent ranked them second. By contrast, only six percent of these American employers ranked reading, writing, math, and reasoning ability number one. The trait that most directly rivaled occupational skills was work habits. Bishop concludes, "*The best jobs tend to go to the graduates who took vocational courses and/or worked part-time during the school year.*"

  Bishop also analyzed the NFIB survey related to success on the job. "*Occupational skills were the only ability that had large positive effects on relative wage rates. . . Academic skills had no significant effects on wage rates.*"

- **Accelerating skill obsolescence has reduced the payoff to occupational training.** Bishop argues that the converse is true—that given high rates of obsolescence, that graduates of skill training programs may be valued because they bring new skills. And so the labor market responds to high rates of skill obsolescence by paying a higher premium for the skill.

- **Rising job turnover has reduced payoffs to occupational training by schools.** Bishop cites data to support the contention that a rise in job turnover rates reduces employer willingness to finance training; therefore there is a greater need for school based occupational training.

Large scale studies show that graduates who took a coherent sequence of vocational courses in high school (and did not enroll in postsecondary education) are likely to obtain more regular employment and higher wages than other noncollege-going graduates provided they are working in the field for which they were trained (Delci & Stern 1999).

Another key finding in the earlier NAVE study (Boesel, Huson, Deich & Masten 1994) is that students who concentrate in a single area of coursework have better economic outcomes than those who take courses in a variety of subjects.

> *The effects of course concentration (earning more than two credits in a specialty) appear to influence outcomes via the link between training and related field. The more credits that trainees take in their major subject area, the higher the proportion of vocational education credits they use on their jobs, and the more likely they are to obtain a training-related job.* (p. 139)

Other findings reported by Boesel include the following:

- Enrollment non-concentration, defined as *not* taking a coherent group of courses, was a consistently large source of course underutilization. This underutilization results in fewer job placements and lower wages.
- High school students who concentrated in a particular vocational field and obtained employment in a related field earned seven to eight percent more than vocational students who found employment in unrelated fields or students who completed a general track in high school.
- The probability of finding a training-related job (which pays higher wages) increases with course concentration.

Kang and Bishop (1989) found that one year after graduation, males who completed four trade and technical courses earned 21 to 35 percent more than those who took academic courses only. Women with four credits of business and office courses earned 40 percent more.

Kang and Bishop (1989) reported data on non-college going high school graduates. Graduates not attending college who took two vocational courses in upper secondary school earned 36 percent more in the year following graduation than those who took no such courses. Those with four vocational courses earned 16 percent more than those with two courses and those with six or more vocational courses earned six percent more than those with four courses. Mane's (1997) analysis of the early labor market success of 1992 high school graduates also found smaller but still significantly positive returns to vocational education in high school.

An analysis of these results (Bishop 1995) suggests that

> . . .*just about every student without definite plans to attend college full time should take at least two (four appears to be best), vocational courses before graduating.* (p. 11)

For occupations requiring more than 600 hours of classroom/shop time to attain levels of proficiency, Bishop recommends technical programs that provide for both high school and postsecondary instruction.

Finally, Bishop (1995) proposes the following theory:

> *It is unwise to devote one's entire education to learning things that most everyone else already knows. One must select a vocation for which one has talent and for which there is market demand and then pursue expertise and excellence within this niche. Expertise and excellence are impossible without specialization.* (pp. 11-12)

He concludes that students should be advised to start building their foundation of occupational skills and knowledge during their final years of high school.

In 2002 the W.E. Upjohn Institute for Employment Research conducted a net impact study of secondary career technical education in *Washington (Washington* Workforce Board, 2003). Upjohn compared the post-high school results for vocational completers with the results for other high school students who did not complete a vocational sequence. The study statistically controlled for demographic variables. They found that secondary CTE is associated with strong positive impacts on post-high school employment and earnings. The study concluded that secondary schools should offer high school students vocational training in addition to basic academic skills and that secondary CTE is cost effective.

Program of Studies/Scope and Sequence

The focusing question for Arizona, is how should CTE be organized into a coherent sequence of courses? Lynch (2000) in a paper commissioned by the U. S. Department of Education proposes a system of high school majors around which to organize a program of study, choose specific courses including the arts and sciences and "professional" or applied work, arrange internships, and other experiences, complete term or senior projects, and collaborate with advisors, faculty, and other students involved with the major. Specifically, he recommends that the "professional" or "applied" subject matter and experiences should comprise about 10 to 20 percent—three to four Carnegie units of credit—of the students' total high school curriculum. It is assumed that all high school students would select a major no later than the junior year or at about age 16.

Career Development

While a comprehensive career development program is part of the total responsibility of schools, CTE plays a major role in delivering career development experiences. Over 40 states have used the National Career Development Guidelines. The guidelines address three areas:

- **Self-knowledge.** Self-concept, interpersonal skills, and growth and development;
- **Educational and occupational exploration.** Relationship between learning and work, career information skills, job seeking, maintenance and advancement skills, and impact of social and labor market change on career; and
- **Career planning.** Knowledge of decision making, planning for diverse life roles, gender issues in careers, and applying career planning skills.

Legislation

Perkins III (1998) defines vocational and technical education as organized educational activities that

- Offer a *sequence of courses* that provides individuals with the academic and technical knowledge and skills the individuals need to prepare for further education and for careers in current or emerging employment sectors; and
- Include competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, of an individual.

A requirement for use of funds in Perkins III is to "strengthen the academic, and vocational and technical, skills of students participating in vocational and technical education programs by strengthening the academic, and vocational and technical, components of such programs through the integration of academics with vocational and technical education programs through a *coherent sequence of courses* to ensure learning in the core academic, and vocational and technical subjects."

High Schools That Work Recommended Curriculum

High Schools That Work specifies a recommended high school curriculum:

- Four English/language arts credits taught to college-preparatory standards.
- At least three mathematics credits with at least two credits equal to Algebra I, geometry, or Algebra II.
- At least three science credits, including two credits equal to chemistry, physics, applied physics, and lab-based college preparatory biology.
- At least one course or demonstrated proficiency in computer technology. The course should be taken early in high school to ensure that students have skills in word processing, database management, spreadsheets, presentation software, the Internet, and e-mail to use in their studies.
- A planned concentration of four additional credits in an academic, career or blended academic and career concentration. An academic major would consist of four in-depth academic courses in mathematics and science or humanities beyond the above-required core, with at least one course being at the advanced placement (AP) level.
- A focus on making the senior year more rigorous for students. Setting a goal that all seniors will take at least three academic courses including a high-level mathematics course; requiring students who receive school

credit for jobs to have work-based learning plans; and requiring students to complete a senior project.

Schools adopting HSTW as a whole school reform design (Comprehensive School Reform [CSR] and urban high schools), would modify the above design as follows:

- At least four credits in mathematics courses, including Algebra I, geometry, Algebra II and a higher-level mathematics course such as trigonometry, statistics, pre-calculus, calculus, or The College Board's Pacesetter Mathematics.
- School superintendent and school board willing to allow the high school to adopt a flexible schedule that enables students to earn 32 credits in four years.
- A graduation requirement of 26-28 credits.

A 2001 study reveals that the two highest achieving groups of students at 25 rural *Making Schools Work* sites were those who took a solid academic core and either more academics or a planned sequence of at least four career courses.

Bottoms (2002) recommends a "coherent series of planned career technical courses." Based on the entire HSTW network (27 states, 1100 high schools), *"We find that students who take a solid academic core and either more academics or quality career technical studies are the highest achieving high school graduates."*

Plank Study

Plank (2001) studied the effects of the balance between CTE and academic course taking. Two definitions were used:

- Academic concentration: completion of four Carnegie units of English and three in each of math, science and social studies during high school
- CTE concentration: completion of three or more Carnegie units in any of the 11 Specific Labor Market Preparation (SLMP) vocational areas of the 1998 Secondary School Taxonomy (SST)

Using those definitions, the study classified students into four types:

- Academic concentrators completed only an academic concentration.
- CTE concentrators completed only a CTE concentration.
- Dual concentrators completed both an academic and a CTE concentration.
- Non-concentrators completed neither concentration.

Since the two definitions of concentrators could only be met over the course of a high school experience, the analysis of high school persistence was measured by a ratio of CTE to academic credits earned.

Using National Education Longitudinal Study (1988) data to determine concentrators and an Education Testing Service battery administered in 1992 in reading, math, science and history, Plank analyzed the difference in test scores of the four categories of concentrators. A consistent pattern emerged across all four areas of academic achievement. Academic concentrators showed the highest achievement and dual concentrators showed the next-highest achievement, trailing by only a small margin.

Controlling for prior achievement, grades, and student background characteristics, the study found the lowest risk of dropping out was estimated to be when students complete three Carnegie units of CTE for every four Carnegie units of academic subjects. A high-risk student with no CTE courses was about four times as likely to drop out as a high-risk student with the three CTE to four academic course taking ratio. Plank concluded: "*Especially for students who are already at risk, a slight reduction in academic test scores might be well worth the increased likelihood of graduating from high school.*"

Figure 4
Predicted Probability of Dropping Out (Plank 2001)

Predicted Probability of Dropping Out, as CTE/Academic Course-Taking Ratio Varies, for a White Male of Average Family SES
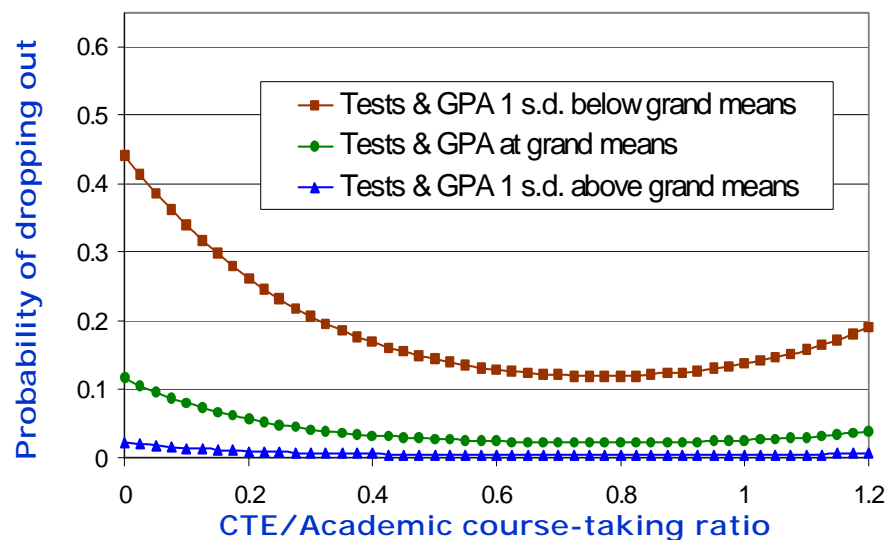
Plank also concluded that no curricular concentration precludes any postsecondary option. He said, *"This suggests that the integration of CTE and academic instruction in high school is, at the most basic level, producing students with multiple options that are both attractive and available after high school."*

USDE/OVAE Core Indicator Framework

The U.S. Department of Education (2003) defined the threshold level of vocational education as a program/sequence of courses or instructional units that provides an individual with the academic and technical knowledge/skills/proficiencies to prepare the individual for employment and/or further/advanced education. They define three levels:

- Vocational participant: Student enrolled in at least one vocational-technical education course.
- Vocational concentrator: Student who enrolled in a threshold level of vocational education.
- Vocational completer: Student who attained the academic and technical knowledge/skills/proficiencies within a program/sequence of courses or instructional units that provides an individual with the academic and technical knowledge/skills/proficiencies to prepare the individual for employment and/or further/advanced education.

States have the flexibility to develop their own definitions of threshold level of vocational education as long as these definitions provide the foundation for the development of high-quality performance measures for all four core indicators.

Table 8 highlights findings and policy recommendations related to a concentration for CTE.

Table 8
Findings and Policy Recommendations for CTE Concentration

Source	Findings and/or Policy Recommendations
Perkins III (1998)	Vocational education is to offer a coherent sequence of courses that provides individuals with the academic and technical knowledge and skills that individuals need to prepare for further education and for careers in current or emerging employment sectors.
Plank study (2001)	Three Carnegie units for every four academic units reduces risk of dropping out for at-risk students

Source	Findings and/or Policy Recommendations
NAVE Interim Report (Silverberg et al. 2002)	Almost 45% of all high school graduates earned three or more occupational credits. Most concentrated in a single program area.
Delci & Stern (1999)	Graduates who took a coherent sequence of vocational courses in high school (and did not enroll in postsecondary education) are likely to obtain more regular employment and higher wages than other non-college-going graduates provided they are working in the field for which they were trained.
Kang & Bishop (1986)	- One year after graduation males who completed four trade & technical courses earned 21% to 35% more than those who took academic courses only. - Women with four credits of business & office courses earned 40% extra. - For graduates not attending college, the more vocational courses taken, the higher the earnings.
Bishop (1995)	Just about every student without definite plans to attend college full time should take at least two (four appears to best) vocational courses before graduating.
Washington Workforce Board (2003)	Students who took a CTE sequence experienced an average net increase in earnings and employer benefits of $3,469 during the first 2 ½ years after leaving high school and an estimated net increase of $71,236 during their working lives.
Bottoms (2002) HSTW-recommended curriculum	- Analysis of graduating seniors in 2001 reveals that the two highest achieving groups were those who took a solid academic core and either more academics or a planned sequence of at least 4 career courses. - Based on the total HSTW network, students who take a solid academic core and either more academics or quality career technical studies are the highest achieving high school graduates - The HSTW-recommended curriculum specifies a planned concentration of four additional credits in an academic, career or blended academic and career concentration.

State Scope and Sequence Models

The current Arizona model for CTE is delivered at three levels:

- Level I, which is designed for grades 7 and 8, is the exploratory level. It represents a core of academic and technical competencies that support all occupations and career exploration for all interest areas.
- Level II, which is designed for grades 9 and 10, serves as the transition between the broad exploration provided at Level I and the occupationally specific instruction provided at Level III.
- Level III, which is designed for grades 11 and 12, provides students with occupationally specific preparation that leads to employment after graduation and/or further education and training.

Level I, Exploratory Level (Grades 7-8)

Several states recommend career guidance activities at the middle school/junior high levels and require students to develop a career plan by the end of eighth grade.

The transition from middle school to high school is pivotal. Castellano, Stringfield, and Stone (2002) say that many of the symptoms of unsatisfactory high school achievement have their origins in middle school, when many students begin to disengage from school. Based on second-year findings from a longitudinal study on CTE-based whole school reform, they suggest that career exploration is believed to be a means of engaging young students at risk of dropping out. Second, some middle-school educators note that career exploration activities, such as service learning and contextual learning, can enhance student development. And finally, beginning career exploration in middle school provides students with more focus and direction as they select courses and programs that will move them toward post-high-school trajectories that they and their parents desire.

Three models with demonstrated success for strengthening the transition from middle to high school include the Talent Development Model Ninth Grade Success Academy, the ninth grade class "Strategies for Success" foundation for the National Academy Foundation academies; and a Transitions initiative sponsored by SREB that focuses on the ninth grade. The ninth grade is a pivotal year that determines whether students will graduate from high school prepared for success in postsecondary education and employment. Components of the SREB transition project include a support class for students identified at risk in grades seven and eight; a summer bridge program between eighth and ninth grade; double dosing in math and language arts in ninth grade; and a personal advisement system through high school.

Level II, Transition Level (Grades 9-10)

There is considerable variation in state models at this level. *Ohio's* career pathway model provides for career cluster foundation courses that are generally offered at the ninth or tenth grade. The courses provide core and cluster competencies, including information on entry-, technical-, and professional-level career pathways within a career cluster. *North Carolina* has specific curriculum designed in their Blueprints for each course offered.

Level III, Occupationally Specific Preparation (Grades 11-12)

State definitions of concentrators are included in Table 9.

Table 9
Definition of Concentrators in CTE in Selected States

State	Number of courses/classes/units for a concentration	Comments
Alabama	3 units of instruction	Provides for diploma with CTE endorsement and advanced CTE endorsement
Arkansas	2 units of credit in an occupational area	
Arizona	2 Carnegie units/credits with a grade "C" or better in a single CTE program. One unit/credit must be in a Level III course.	
Maryland	CTE student enrolling in a course at the *Concentrator Course* level	Equates to 3 Carnegie units for most of the technical courses, but may be less for business ed and family and consumer sciences
Missouri	2 or more vocational credits	
Nebraska	3 or more CTE courses, or all course offerings in an area	
New Hampshire	Completed greater than 50% of the required sequence of instruction and enrolled in the second half	
New York	3 to 5 or more courses	

State	Number of courses/classes/units for a concentration	Comments
North Carolina	4 technical credits in a career pathway, including one which is designated as a state completer course	Course-based beginning with grades 7-8 and then defined in four levels
North Dakota	2 or more courses	
Ohio	CTE student enrolled in the last class of a series within a program or is in the final class of a competency-based series of experiences	450 hour CTE programs equate to 3 credits
Oklahoma	Sequence of courses in an occupation	Career concentration: foundation, core, and specialized courses or programs which assist a student in deciding on an occupational goal
Oregon	2 or more credits	
South Carolina	4 Carnegie units of credit in career and technology course work leading to a career goal	Only concentrators and completers are to be assigned a CIP code
Texas	3 courses in a single labor market preparation program	4 or more courses is considered a "specialist"
Washington	Competencies needed to earn an industry validated skills certificate	Concentration courses are post-exploratory

Some states speak generally to the completion of the competency identified for the program or sequence of classes. However, the level of achievement for completion may not be addressed, may be determined at the district level, or may be determined by applying a formula.

Career Clusters

The purpose of organizing programs and instruction around career clusters is as follows:

- Provide a "big picture" to students of career options and understanding in a broad industry.
- Enhance academic achievement of all students-- "leaving no child behind."

- Provide a common theme for communication from state to state.

Career clusters can help students build career pathways by providing the broader, long-term focus on preparation for the workplace (Edling and Loring 1996):

- Organizing programs around a whole range of occupations in a larger career area provides students with more alternatives and flexibility for both work and continuing education.
- Integrating academic knowledge and skills thematically in a career- or work-related context helps contextualize academic learning for students, making math, science, and communication relevant to students as a means to an important end—success at work and in life.
- Career clusters help integrate and contextualize employability skills and make them relevant to students.
- The workplace focus and potential for integrated, contextual learning make career clusters an appropriate educational framework for many students—perhaps all students.
- The concrete, specific context of career clusters helps students see both the big picture of a broad career area and how they can individually fit into the big picture.
- All in all, clusters are a happy medium—big enough to provide a relevant context for a wide range of knowledge and skills yet still small enough to be concrete and tangible.

State CTE Career Pathway Designs

Most states organize around a career cluster or career pathway framework. In some states, the traditional program areas (Agriculture, Business and Marketing, Family and Consumer Sciences, and Trade and Industry) are organizers for state leadership. And, in some of those states, the curriculum delivery patterns reflect the state agency organization patterns. While in other states, even though the organizing sections have retained traditional labels, the curriculum is delivered across a variety of career cluster formats. In South Carolina, each of the 16 career clusters has an identified state staff lead person. Washington has four state staff assigned to the 16 career clusters.

Nearly all states have designs that proceed from exploratory to specialized. States vary greatly in the governance and degree of state prescriptiveness for those pathways. *Washington* has a model that is flexible in approach. *Ohio's* model is flexible also, but the state funding system is an incentive for state adoption. *North Carolina* has a highly integrated and prescriptive pathway structure that receives major state funding. *Florida* and *Texas* have a similar structure. *Georgia* is moving toward being competency based. *Alabama* is also

flexible and provides for an advanced pathway, including a baccalaureate goal. Most states would be classified as local control states that provide guidelines for curriculum. However, states are more prescriptive about what is required to be a program concentrator.

Washington

Washington has approved proposed standards for exploratory and preparatory programs. Exploratory classes are for secondary students who want to investigate a broad range of career options within a pathway. Preparatory programs are designed to be a sequence of classes for "post-exploratory" students who have decided to focus on an occupation or cluster of related occupations within a specific career pathway. While the Certificate of Mastery is desirable to enter a Preparatory Program, it is not a prerequisite. Exploratory and Preparatory students may also be enrolled in the same course simultaneously (course content may be exploratory for one student and preparatory for another).

The scope and sequence is currently under revision. For example, the business education framework will include exploratory and preparatory courses organized around five of the sixteen career clusters developed by the U.S. Department of Education. The five clusters in the Business and Marketing Pathway include: Business, Management and Administration; Finance; Hospitality and Tourism; Information Technology; Marketing Sales and Service.

Texas

Texas CTE curriculum is organized in coherent sequences within the program areas. Introductory and upper level courses are delivered in middle grades and in high school, (Grades 6-7 and Grades 8-12). Curriculum is developed through the "*Texas* Essential Knowledge and Skills" curriculum framework. The frameworks provide course recommendations for *Texas* academic course requirements at each grade level.

Ohio

Ohio's model is based on three levels—core, cluster/foundation, and specialized.

   1. Career Pathway - Core. The five core competencies (core ITAC) were developed from an analysis of the national standards databases, including academic, SCANS, and skill standards, and validated with business and industry advisory panels. This model has been adopted or adapted in other states including *Idaho*. The five core competencies are as follows:

- Solving problems and thinking skillfully
- Communicating effectively
- Applying technology
- Working responsibly
- Planning and managing a career

2. Career Pathway – Cluster/Foundation. *Ohio's* cluster foundation courses are generally offered at the ninth or tenth grade level and can be a solid starting point for intensive specialized vocational and academic course-work at the eleventh and twelfth grade level. Examples of foundation courses include the following:

- A year-long foundation course in Business Management can include core and cluster competencies in business and marketing fundamentals, economics, and information processing.
- A summer foundation experience in Industrial Engineering can include core and cluster competencies in manufacturing processes, blueprint reading, and computer-assisted design, and it can provide an overview of career opportunities within the field.
- For many clusters, the Family and Consumer Sciences Life Planning course and the Business and Management cluster foundation course can be an appropriate broad beginning experience.

3. Career Pathway – Specialization. *Ohio*'s specialization ITACs represent a profile of the professional or occupational competencies deemed essential for a graduate to perform proficiently when he or she graduates from the specialization workforce development programs. The specialization competency profiles are organized so that they can be clustered or grouped in a modular approach. Individual curriculum specialists can use the competency profiles to develop instructional programs based on local needs as determined in conjunction with their local advisory committees.

North Carolina

North Carolina has competency-based courses in eight traditional program areas, with each area having school-based, work-based, or community-based learning opportunities. The course offerings are organized into Grades 7-8 (exploring) and four levels in which grade levels are not specified (with the exception of Health). To be a program concentrator, students must be enrolled in an advanced or completer class.

Florida

Florida is organized based on traditional program areas. They have defined outcomes for a semester exploratory course, Grades 6-8. Practical Arts courses are also designed to provide generic skills that apply to many occupations but are not designed to prepare students for entry into a specific occupation. At the secondary level, job-preparatory instruction prepares students for entry into an occupation, and includes diversified cooperative education, work experience, and job-entry programs that coordinate directed study and on-the-job training.

Florida has course standards established by rule that include a curriculum framework and student performance standards. The standards do not prescribe how instruction should be delivered. Program course standards are based upon competencies required for entry, advancement, and upgrading in occupations in the career technical program areas.

Georgia

Georgia is developing curriculum frameworks that include two components: core employability skills that are integrated throughout the instructional course sequence of a given program and the technical skill standards that reflect the occupational-cluster performance unique to a given course. Performance standards that are being developed are intended to "convert vocational skills accountability from course-passing to competency-based performance assessment." That process is to be completed by the end of FY 2003. The performance standards included within each framework are articulated with postsecondary performance standards.

Alabama

Alabama's framework for career technology studies includes content standards and deliberate alignment with the state's academic requirements for graduation. The delivery system is intended to be flexible for students and for schools. A Career Discoveries course (one or two semesters) is offered in the middle grades. This course covers the broad base of career overviews and technological studies. A Career Explorations course is offered in the high schools to provide an introduction to two or more technologies and career areas. The basic CTE structure includes a curriculum core (necessary for all work), and clusters (Agriscience, Business and Marketing Education, Family and Consumer Sciences Education, Health Sciences, and Technical Education). From these clusters, students choose a two-course minimum major.

An example from the Healthcare Science and Technology (Health Sciences Cluster) follows:

Path 1. Healthcare Technology is a two-year program taken to earn three credits from the following courses:

- Foundations of Healthcare (one credit)
- Advanced Healthcare (one credit)
- Healthcare Specialization (two credits)

Path 2. Healthcare Science (one-year program) for high school students who have successfully completed biology, chemistry, and physics, or advanced biology and have a health care objective that requires a baccalaureate or higher degree.

Alabama provides a high school diploma with Career Technical Endorsement and a high school diploma with advanced Career Technical Endorsement. To earn the CTE endorsement, students must complete the required core academic curriculum, consistent with the State Department of Education and local board and a coherent sequence of three career technical courses in a career major. For the Advanced Career Technical Endorsement, advanced level work must be completed; and core curriculum requirements may be satisfied by credit earned through applied academic courses or embedded or substitute credit situations. (At least three CTE credits are required for the advanced endorsement.)

CTE Delivery Structures

How should CTE be delivered? The following delivery structures and organizations are supported in research and in the CTE literature.

Career Academies

A career academy is a small learning community, in which a team of teachers serves a group of students with a career theme as the focus, using the workplace as an organizing theme. The *Breaking Ranks* report (1996) calls for the personalization of high schools which it defines as breaking high schools into units of no more than 600 students. Career academies are consistent with the tenets of high school improvement and career technical education. A coalition of nine organizations agreed upon three common components of career academies (CASN 2002):

- **Small learning community.** A career academy is a small learning community within a high school, which selects a subset of students and teachers for a two-, three-, or four-year period. A career academy

involves teachers from different subjects working together as a team. This team manages the program, with one member usually serving as the coordinator or lead teacher. An academy functions as a small learning community within the larger high school and requires administrator and counselor support.

- **College preparatory curriculum with a career theme.** Classes are linked to academic and industry standards, encourage high achievement, and show students how their subjects relate to each other and the career field. They are designed to expose students to the full range of careers in that field. Special projects require students to bring together academic skills across their subjects and apply these to community and work settings outside the school. Usually the junior year includes a mentor from a supporting employer, and the summer following the junior year and/or senior year includes work experience, a paid or unpaid work internship or community service assignment. During the senior year students are provided with college and career counseling, forming a post-graduate plan that may include college, a mixture of work and college, or full-time work.

- **Partnerships with employers, communities, and higher education.** The academy career theme is selected locally, based on an industry that is healthy and can provide a cadre of partners interested in supporting the program. Employers from a group of companies in the selected field work as partners in the academy, serving on a steering committee (along with teachers, administrators, and often parents and students) that governs the program's development and operation. This committee helps to plan the various activities in which employee volunteers participate: as speakers at the school, informing students of the industry and career options; as field trip and job shadowing hosts at their companies; as individual mentors, career-related "big brothers and sisters"; as work internship supervisors during the summer or part-time during the school year; and as community service coordinators. Postsecondary educational institutions are often included as well, providing course articulation and concurrent enrollment options.

Hoachlander, Alt & Beltranena (2001) believe that career academies are the most clearly defined and most promising of the work-based innovations in high schools. They attribute this partially to the well-defined structure and implementation of academies.   It is estimated that there are between 2,000 and 2,500 career academies nationwide (Kemple 2001). Stern et al. (1998) reviewed several studies of career academies and concluded that the evidence on balance suggests that the academy graduates are more likely than non-academy graduates to attend college. Lynch (2000) says that career academies seem to hold great promise for many high school students, their teachers, and the reform of high schools themselves.

Several studies in *California* have found that academy students perform better than similar students in the same high schools who are individually matched with academy students on demographic characteristics and ninth grade records of grades, absenteeism, and disciplinary problems (CASN, 2002). One research report (Kemple 2001) has not found positive effects on student achievement.

Research is supportive of small schools and small learning communities. Raywid, cited in a U.S. Department of Education (2001) publication, says: "*We have confirmed [the positive effects of small schools] with a clarity and at a level of confidence rare in the annals of education research.*" Cotton (2001) wrote a compendium of research findings on small learning communities and concluded: "*Research conducted over the past 15 years has convincingly demonstrated that small schools are superior to large ones on many measures and equal to them on the rest.*"

The State Board of Regents for elementary and secondary education in *Rhode Island* recently passed a mandate that by 2005, all school systems must put in place strategies for ensuring more personalized learning environments, such as by creating smaller schools-within-schools (Archer 2003).

How small is small? Some researchers and writers suggest a maximum size for a school at 500 students, but most assert an upward limit of 400 (Cotton 2001). Raywid (1999) says that those who emphasize the importance of school as community tend to set enrollment limits lower than do those who emphasize academic effectiveness. The Career Academy Support Network recommends 100 to 300 students for a career academy. Career academies are developing models of integrated curriculum that schools can emulate as they consider curricular reform.

Raby (1995) says

> *Curriculum integration in career academies shows students connections across disciplines and the importance of workplace skills to their futures. As a result, their attendance, grades, and course completion rates improve. Graduates are successful in job placements and most enroll in postsecondary education.* (p. 96)

Work-Based Learning

Work-based learning includes a continuum of experiences that range from field trips and speakers from business and industry to internships in the workplace and licensed apprenticeships. Hamilton and Hamilton (1997) identified eight types of work-based learning activities:

- **Field trips.** One-time visits to observe work sites

- **Job shadowing.** Longer-term activities, including multiple visits to observe a worker onsite
- **Service learning and unpaid internships.** Voluntary activities that may or may not have a direct career focus
- **Youth-run or school-sponsored enterprises.** Workplaces created in or by schools to provide experiences producing and marketing goods or services
- **Youth jobs.** Jobs typically open to teenagers that may not offer structured learning opportunities
- **Subsidized employment training.** Part of a training program supported by federal or state funds
- **Cooperative education and paid internships.** School-related, paid work experience
- **Apprenticeships.** Long-term, structured work-learning programs leading to certification or licensure

A significant part of apprenticeship training take place on the job, usually in conjunction with programs sponsored by the Department of Labor. Students receive recognized and accepted credentials that certify achievement. Apprenticeships are not widely practiced in the United States, as they require a high degree of structure, long-term commitment for students, and financial support from business and industry.

Students in cooperative education receive classroom instruction related to their co-op placement. Co-op placements generally require paid work, supervision by teachers and a workplace supervisor. The effectiveness of the co-op experience depends upon the training agreement that specifies the competencies to be gained and the quality of the work experiences.

Studies and evaluations have generally found positive associations between participation in approaches involving work-based learning and students' educational outcomes. Positive effects have been reported throughout the whole range of high school experiences, from attendance to course taking to graduation (Wonacott 2002). The premise for the success of this work-based learning is that the real-world context of work not only makes academic learning more accessible to many students but also increases their engagement in schooling.

Tech Prep

Tech Prep is the primary strategy for improving transitions to college (Silverberg et al. 2002). Tech Prep is defined in the Perkins Act (1998) as a program of study that does the following:

- Combines at least two years of secondary education (as determined under State law) and two years of postsecondary education in a non-duplicative sequential course of study
- Strengthens the applied academic component of vocational and technical education through the integration of academic, and vocational and technical, instruction
- Provides technical preparation in an area such as engineering technology, applied science, a mechanical, industrial, or practical art or trade, agriculture, a health occupation, business, or applied economics
- Builds student competence in mathematics, science, and communications (including through applied academics) in a coherent sequence of courses
- Leads to an associate degree or a certificate in a specific career field, and to high skill, high wage employment, or further education

The inconsistencies in defining a Tech Prep student have made it difficult to obtain reliable national data. Bragg (2001) says that in comparison to graduates of the same high schools who did not participate, graduates of "mature" Tech Prep programs are more likely to do the following:

- Enter two-year postsecondary education to a slight degree
- Be employed and among all graduates who are working, to be employed full time
- Hold more highly skilled and technical jobs
- Receive larger wage increases

Arizona is divided into twelve consortia that are overseen by individual leadership teams and a local tech prep director. Community colleges and high schools around the state have partnered to jointly design and implement coordinated sequences of instruction to link high school and post-secondary CTE programs. According to the Arizona Tech Prep website, Tech Prep provides each student with the following:

- A career pathway with an identified sequence of courses that leads to employment.
- Employability and technological skills.
- Advanced occupational training identified in partnership with business and industry.
- Articulated programs leading to certification and/or a degree.
- A curriculum integrating academic and occupational learning and application.

Bragg (1995) identified six criteria for quality Tech Prep programs:

- Tech Prep must be grounded in an integrated and authentic core curriculum.

- Formal articulation must occur between secondary and postsecondary levels.
- Work-based learning experiences should be integrated.
- Tech Prep should be developed as a standards-driven, performance-based initiative.
- Tech Prep should be accessible to all students.
- Joint planning, development, and implementation between all stakeholders are critical to success.

Related to Tech Prep strategies are state dual enrollment and postsecondary articulation policies. In 2001, *Kentucky* had over 4,000 students in dual credit technical courses.

Career technical Student Organizations

Career technical student organizations (CTSOs) are an integral part of CTE curriculum. Students enrolled in CTE courses are eligible for membership. Approximately 1.6 million students are currently in CTSOs. CTSOs provide co-curricular experiences and activities and strengthen career technical instruction. The eight national CTSOs are FFA – agriculture; Distributed Education Clubs of America (DECA) - marketing, Family, Career and Community Leaders of America (FCCLA) - Family and Consumer Sciences; Future Business Leaders of America (FBLA) and Business and Professionals of America – business; Skills USA-VICA - technical; Health Occupations Students of America (HOSA) – health; and the Technology Students Association – technology. A key component of the organizations are skills competitions based on national standards.   Most of the organizations provide opportunities for students to experience leadership activities at the district, state and national levels.

Distance/Online Courses

In recent years a number of states have developed distance learning opportunities. The *Florida* Virtual School is the largest in the country and offers over 65 high school courses. *Kentucky* high schools offered courses over the Kentucky Educational Television channels in agriculture that could earn students college credit. The Southern Region Education Board (2001) has issued guidelines for web-based courses for high school students.

Summary

Some suggest that there is more consensus for the mission of CTE than there is for its implementation. The challenge for CTE is to build an integrated system of career pathways that expands options for students. These pathways should

provide different points of access and exits controlled by posted education skill standards. Every exit from a learning path should be validated by accredited learning and lead either to work or continued progress along another learning path (Carnevale & Desrochers 2002).

The criteria for the design of the CTE delivery system in Arizona should (1) emphasize broad, long-term conceptions of work; (2) require high levels of rigor in career technical instruction; (3) strengthen academic foundations; (4) require strong secondary-postsecondary connections; (5) eliminate tracking; and (6) lead to improved economic outcomes.

The second section of this chapter addresses specific issues related to organizing CTE into a coherent sequence. Based on federal legislation, national models such as HSTW, and numerous research studies, it appears that students who concentrate in CTE, defined as minimally three Carnegie units, have better outcomes than those who do not.

CTE Division staff should review the research support for delivery structures and exemplary models, including career academies, work-based learning, Tech Prep, and Career Technical Student Organizations.

Chapter 7
Arizona Model – Survey and Focus Group Results

A major focus for this study was to survey practitioners about the Arizona model for CTE. The model identifies three levels for delivery of CTE:

- Level I, which is designed for grades 7 and 8, is the exploratory level. It represents a core of academic and technical competencies that support all occupations and career exploration for all interest areas.
- Level II, which is designed for grades 9 and 10, serves as the transition between the broad exploration provided at Level I and the occupationally specific instruction provided at Level III.
- Level III, which is designed for grades 11 and 12, provides students with occupationally specific preparation that leads to employment after graduation and/or further education and training.

A survey instrument (See Appendix B) was sent by e-mail to all of the CTE directors in Arizona and approximately ten percent of CTE teachers. However, as noted in the limitations of the study, there were some e-mail addresses that were inaccurate. CTE directors and teachers could respond directly by e-mail, call the researcher, provide a time for the researcher to call them, or mail their survey form.

Nearly all of the 119 respondents returned the survey by e-mail. In some cases, the researcher responded to e-mails with clarifying questions. Some respondents called or requested to be called and those calls were transcribed.

Responses from CTE directors and teachers represent all 15 counties and 65 schools/districts. (See Appendix A). Table 10 shows the response to two questions:

- **Design.** On a scale of 1 to 10 (ten being high), how effective is this delivery model in helping students achieve the mission?
- **Implementation.** On a scale of 1 to 10 (ten being high), to what extent does your school use this delivery model?

Table 10
CTE Director and Teacher Survey Responses

10 point scale (10=high)	Effectiveness of Design			Degree of Implementation		
	Directors (n=63)	Teachers (n=56)	**Combined (n=119)**	Directors	Teachers	**Combined**
Mean	5.61	7.33	6.27	7.90	8.22	8.16
Median	6.00	8.00	7.00	8.00	9.00	9.00

In response to the effectiveness of the design question, directors rated the model lower (5.61) than teachers (7.33). Both groups rated implementation of the model higher than the design. However, they frequently explained this higher rating by indicating that the model was mandated for funding.

The most common overall descriptor for the model from both directors and teachers was that it is *"in theory, a great model, but . . . "There* appears to be a disjuncture between theory and practice as evidenced by these observations:

- o *In theory, teachers can depend on the students coming to them with certain competencies.*
- o *Looks wonderful on paper, but in actual practice is not realistic.*
- o *Looks good in theory and on paper.*
- o *Its intent is good.*
- o *Ideally it is a wonderful model. In reality, many students do not have the time in their schedules to take all the classes needed to complete the program.*
- o *"When implemented correctly", students are given foundation skills they need to build on as they go through the program.*
- o *In concept, the use of Levels might seem to make sense.*
- o *I can only see strengths conceptually, not in practice.*
- o *Theoretically it delivers basic skills necessary before going to another level and prepares students in the skills necessary for success in a particular occupational field.*
- o *It is a good plan, but is hard to implement.*
- o *The model in theory is good. The application sometimes is ineffective.*
- o *Intent is to provide students with a sequential in-depth learning experience. If a student had the time in their schedule this would be a meaningful experience.*

- General enough to be helpful in most districts.
- *I believe this is a great model. Our problem is getting students to commit to a program when they are freshmen or sophomores.*

A director said, *"It is time for the delivery model, originally created in 1987, to be reviewed. Times have changed, and the model needs some adjustment."*

Another director said, *"The model is OK as a model, but has been used as a 'required' component of every program since accountability has increased (to painful levels)."*

Strengths

A number of strengths of the model were noted. Most frequently cited was that the model provided a coherent sequence, a progression of skills mastery that logically allows the student to progress through the CTE program. One director called it a "stair-step" model:

- *Students should have the initial introduction, build up the interest, and then prepare themselves for a career.*
- *Focuses students on career paths; allows them to narrow focus as they get older.*
- *Concept of a broad exploration in Level I and narrowing focus by Level III helps students focus in on their interests and aptitudes.*
- *Provides for a smooth transition.*
- *Works well in our school.*
- *Level III class tied to real world employment.*
- *Consistent and outlined path of instruction that allows a student to more fully understand and benefit from the program. When implemented in the manner designed, it can be highly effective in helping students transition into the work world. .*

A teacher said, *"I really think that it is a good working model and is the best that I have seen out there."*

The model provides for career exploration:

- *Allows students more time and maturity to decide on a career focus.*
- *Considers importance of career exploration before making a commitment to a CTE program.*
- *Progresses from general survey to specific.*
- *Encourages students to explore many careers to better understand them and make a better informed decision.*
- *Allows younger students to explore career choices and opportunities.*
- *Students are able to investigate careers.*

Consistency was another theme. It is a uniform system. There is consistency among districts—*"a standardized structure for Arizona."*

Another strength cited was the data for reporting, including curriculum competencies. A teacher said, *"All competencies are well written and indicators are easy to find and follow."* This model appears to support common data sets. A director said, *"The fact that the competencies for each of the programs are standardized by the state assures every student of having the opportunity to develop the skills that will allow them to be competitive in the job market."* A director said he believes that the competencies relate to the skills necessary to succeed.

A director believes that one of the strengths is the curriculum model that includes input from business and industry. Also related to the curriculum, one director said that the career-related competencies are clearly laid out.

A teacher said, *"The model is working fine for our district. There is not ever going to be a model that suits everyone's needs perfectly."*

Limitations

Several respondents ranked implementation "high", but with notes to the effect that there is no choice if they want funding. A director said he rated implementation a "7" *"only because it is mandated."* Another said, *"We meet the letter of the requirements of the model because it is required from the State. For the most part this is a paper shuffle and is a hindrance to the implementation of quality programs because of all the energy it detracts from quality program delivery."*

One director said, *"There is nothing at the seventh and eighth grade level."* Another said, *"This district had not made a commitment to a sequenced career pathway."*

A teacher said, *"We work very hard at getting our counselor and principal to use this model when scheduling students. Our problem is small school and limited class offerings and so students are put into Level III without having Level II.*

The model is dependent upon counselors putting students into the correct grade level and class. This seems problematic in several schools.

A director said, *"Since we use federal funds to ensure that the model is used, we do use it but my staff is not happy about it."*

Another director indicated that they try very hard to follow the model but are not successful in having the numbers of completers or concentrators.

The most common theme was that the model is difficult to implement. A teacher said, *"Good model, but not often followed."* Another said, *"Difficult to follow with certain grades."* Reasons varied and are reflected below. The issues listed are in priority order based on the frequency of responses.

1. Too Rigid and Restrictive

- *Too black and white. Does not allow for uniqueness or differences in districts, communities and schools.*
- *Too rigid. Requires too much prior to students getting to the career training.*
- *Model is restrictive, does not take into account an effective educational development process, and leaves very little room for local program uniqueness.*
- *Do not like the rigidness that the DOE applies to this methodology through transcripts.*
- *Structure has become too rigid in application.*
- *Model does not appear to allow for alternative methods of competency attainment, i.e. prior work experience of the student.*
- *Don't agree with the rigidity of the system—at our school parts of Level II would be better delivered at the eighth grade*
- *Following model is very restrictive due to scheduling and faculty constraints. Many students are still exploring when the Level III curriculum is intended to be delivered and there is a stigma to taking Level I and II courses when you are an 11th or 12th grade student.*
- *Too restrictive. One size doesn't fit all. There are those who maintain that every student in every school MUST complete the same curriculum with the same teaching methodologies in order to be in compliance.*
- *Competencies attained in one program area cannot transfer to another area.*
- *Doesn't allow the necessary flexibility for some districts in the way it is administered.*
- *We do not always control what students receive in other schools and we cannot force students to complete the model as designed. If students drop out or relocate to other schools in the process, the chances of them benefiting from the program are significantly reduced.*
- *Don't agree with the rigidity of the system. At our school, parts of Level II would be better delivered at the eighth grade.*
- *Diversity, not conformity, is what made American so great.*
- *Model, when developed was meant to be a conceptual model, not mandated.*
- *When they superimpose a model on the rural schools, it doesn't work.*

- *Model is not flexible enough for small schools with limited teaching staff.*
- *In a rural school, with limited instructional staff, it is difficult to deliver, especially in that it is often in conflict with regular graduation requirements.*
- *Appears to cater to urban schools.*

A teacher in a school of 100 Native American students believes the model does not provide enough flexibility for unique situations. She describes problems such as a failing elementary school, poverty, unemployment, alcoholism, drugs, and crime and suggests that students need to be taught skills such as coming to school and being prepared and not impaired. Noting that the reservation has limited resources, she suggests that she start Level I with job shadowing and employability skills. Level II would provide work-based experiences and Level III work for pay. She also notes that students have artistic talents and suggests entrepreneurial opportunities for students to refine their art (painting, drawing, beading, sewing, weaving) and sell their products.

2. Limits Student Access to CTE

There were several statements to the effect that students are ready and interested in Level III, but the model denies them access until they are in the eleventh grade:

- *Students make decisions later (in 11th and 12th grades) and they can't complete the program.*
- *Limits students who know what career they want to pursue as 10th graders due to no funding for that grade level.*
- *Most students are ready for Level III by their sophomore year. We often lose students' interest in Level III because of the year delay.*
- *We have the model in place and it is helpful for students who take the Level II as freshmen, however many students don't figure out their career interest as freshmen and don't take the correct Level II or any Level II. They can still complete the Level III program competencies without Level II and be successful.*
- *Doesn't allow flexibility for students who fail to plan ahead or come in from other schools.*
- *How do you deal with the student who is a junior and suddenly decides that he is interested in auto and hasn't had level I, he goes down the road...*
- *It is difficult to get students into the correct sequence, especially as we have a very mobile population.*
- *Doesn't allow some students to be a completer, and for some it's even hard to be a concentrator. Due to requirements to graduate, preparation courses for the high stakes graduation courses and the design of the schedule, they never get to fit the top level III courses into their educational plan to graduate from high school.*

- *Doesn't allow students to be completers if they do not complete all levels. Our district is changing requirements for junior high students (because of State AIMS test). This will limit courses students are able to take. Thus we will have fewer Level I students. We do not have the elective courses available (too many requirements needed) at the high school level to make up this loss.*

This director describes the access concerns of a larger district:

In the abstract and the ideal, it would "appear" to be "logical" and "sequential." However, in practice, especially in comprehensive junior and senior high school settings, it is pretty much unworkable. In these days of increasing academic demands, competing "interest" demands, the demand for AIMS remediation, tight budgets (hey, this is Arizona!), etc., it is pretty much impossible to get large numbers of students through a program sequence as defined by the ADE. Just look at our numbers. We have nearly 4,000 students enrolled in CTE at any given time. At the point of being able to count completers, we're down to miserably low numbers. To some extent, guidance, etc. may be to blame. Much more so, however, are the competing offerings of a large public secondary school system with large comprehensive high schools in an upwardly mobile community that expects all great things from its schools.

3. Reduces Opportunity for Needed Focus on Teaching and Learning

- *The model does not help students achieve the mission. What does aid in student success is the curriculum, the teachers, and student ability.*
- *The model is outdated and, over time, has become more important than the curriculum.*
- *Program teachers have to devote a tremendous time to Level II. If reduced, they could devote more time to the development of more quality Level III experiences.*

4. Program and Curriculum Too General

- *It includes Level I for everyone, making it part of the general education requirement, not elective and vocational in nature, and Level II which is a core of general knowledge lumped together in random and un-researched arbitrary clumps, then regimented to be prerequisite for topics that are not related other than by someone's opinion—certainly not by curricula relationships.*

- *Requirements at the first two levels are general in nature to the point of near uselessness.*
    - *Level I courses are too broadly defined and really do not steer students to the CTE area of learning.*
    - *Middle Schools rarely make the connection, besides Level One is too general to really mean anything. Most Level I areas are taught in regular classroom settings as a part of general middle school curriculum.*
    - *Students want to be in the foods class or the auto class, not in a generic class... Students do not want to wait until they are juniors or seniors to do the actual class.*
- *Limiting students to only be able to take courses at certain times causes students to become less excited about the programs.*
- *Forestalls the delivery of hard-core vocational competencies until the last two years of high school and forces students to spend time on broader based competencies that are not that interesting (not hands-on) and really don't contribute to the important job skills given the limited time they have for electives."*
- *We are a small school and can't always get the "right" grade into each level. Too much financial weight is placed on that part which penalizes us, when in fact we are able to retain the students better when they start the level II & III earlier.*
- *There is a gap - students often have to wait until they are in the 11th or 12th grade to enroll in Level III. They become disappointed and lose interest.*
- *Needs to be more flexible so that some students who have already had the Level I and II could go right into III.*

5. Other Curriculum Issues

- *Competencies are not relevant to job market. Not enough opportunities for practical experience in rural setting. Programs do not relate with current job market in our area.*
- *There's no correlation of CTE competencies with academic competencies.*
- *Some of the competencies are too complex. It's hard to measure some of them, especially Level III.*
- *The requirements at the first two levels are general in nature to the point of near uselessness.*
- *Competencies for Level II are poorly written.*
- *Many, if not most Level II experiences are not realistic for the cluster of occupations that they are supposed to cover. This is especially true for Industrial Technology.*
- *Level I competencies so weak that "one must ask themselves what is the point?"*
- *Levels I and II are not as clearly defined in practice as they are in writing.*
- *Too broad at Levels I and II. This may cause students to fail at Level III.*

- *Problem with duplicated competencies. Students get same competencies in elective classes, English etc. They "go through the career center again."*
- *Documented competencies are often repetitive in program areas. Teachers are unaware competency has previously been attained.*
- *Some of the competencies are too complex, especially Level III.*
- [Referring to the Business Information Technology Systems] *Of the 22 competencies I must teach in A+ Computer Repair, only four of them are directly related to computer repair. Perhaps, the state needs to require a Level II "soft skills" course for all programs that would be the same for all programs instead of including them in Level III competencies. The Level III competencies should be more specific to the student's career choices from that pathway.*
- *Not enough teachers in the field involved in competency design. One size does not fit all.*

6. Lack of Time and Scheduling Concern

- *Students don't have time in their schedule. Graduation requirements have increased. Students who don't meet standards for AIMS test must take support classes for language arts and math.*
- *Our students must earn 24 credits to graduate. If they fail one class for one semester they are no longer on track for graduation. We lose many students for remediation purposes…The students do not have enough time in their schedule to take 3 or 4 elective classes.*
- *Scheduling, scheduling, scheduling! With such few electives in one rural high school, it is sometimes necessary to the advisors to place students where there is room, even if they are out of sequence. Also with the State budget so tight, we at the local school must insure that every teacher is carrying their load in terms of numbers or we must cut positions in order to balance our district budget.*
- *Schools with traditional six-period schedules do not have time in the required course for students to take all the "sequence" of courses required.*
- *Not all schools are consistent with implementation due to various schedules (block, modified/block, four-day, year round traditional).*
- *Students are unable to give three years to the program.*

7. Specific Concerns with Level I

One junior high Level I teacher said, *"It is very difficult for all junior high teachers to coordinate efforts of administering the Level I competencies. It is even more difficult for the high school to receive this documentation."* However, most of the

concerns with Level I were stated from the perspective of the receiving high school:

- *Level I not practical due to number of credits dedicated to the state academic curriculum and the AIMS tests.*
- *Lack of "control" over junior high/middle schools for Level I.*
- *Multiple feeder junior high and middle schools with differing delivery of Level I.*
- *Have no authority to manage it.*
- *Have no control over whether or not students receive Level I instruction from their respective middle schools.*
- *Have 13 junior high schools feeding 6 high schools. For competency tracking and program offerings, this is a logistical nightmare.*
- *Level I is disconnected from Levels II and III even in a unified school district.*
- *Have six to eight feeder schools that may or may not be teaching this level. I find that we end up combining Level I and II at the ninth grade level to make sure the competencies have been across the board.*
- *We are fed by two separate K-8 districts with whom we have, at times, had some articulation, but it has been scant at best. Thus we have tried to incorporate the Level I competencies into our instruction and delivery of our curriculum, as we are held accountable for all three Levels as we report competencies.*
- *Again, for a union high school district to implement this model, we have to "trust" that our feeder elementary districts are, indeed, delivering the Level 1 competencies. This is made even more difficult because there is no way we can track whether students have even been enrolled in Level 1 courses as K-8 students do not come to us with a transcript. Thus, the burden is on us to ensure that we are incorporating Level 1 competencies into our curriculum.*
- *Union high school districts cannot verify Level I work at the elementary site and most elementary sites do not offer CTE programs.*
- *Many students at the middle school are not ready to begin the Level I.*
- *School districts see no connection between 7th grade tech lab and 12th grade auto lab. There is no money for Level I so why support it? Many school districts are elementary only and there is no connection to the high schools/programs.*
- *Works well in unified school districts where the Level I/middle school/grades 7 and 8 are in the same loop with the high school teachers, CTE Director and the curriculum. Does not work where the 7th and 8th grades do NOT collaborate with the high school such as the _____ HS districts.*
- *The difficulty lies with getting the principals/teachers from another school to attend, buy in, create curriculum and track students in the Level I class. Or if the competencies are split between more than one class, getting more than one teacher to do the work required.*

- *Redundant in that Level I competencies are so broad that they are virtually covered in the Level II and Level III courses.*
- *Since we are a Union district, we have five other feeder schools that come to us with varied levels of Level I, forcing our district to absorb the six competencies within our Level II and III programs. If you take a look at the Ag model that incorporates Level I, respective Level II and the Level III standards into a comprehensive four-year program, the dividends are much bigger. We attract students that way and the majority of them stay the entire four years.*
- *The assumption is that the broad based exploratory experience at Level I will give the student exposure to a wide variety of occupations and will enable the student to choose an occupational cluster as an area of interest. In reality, the broad based exploratory experience is rarely delivered well enough for the student to have meaningful experiences and make a good choice….The other assumption is that there will be appropriate counseling for the student to make a valid choice for Levels II and III, but most often the counseling is not a significant or meaningful factor in the experience.*
- *Even though we are a unified school district, I have serious doubts about the commitment of the middle school administration to buy into the coherent sequence at their level. The teachers do a good job, but they are not vocationally certified, are on the fringes of the curriculum. Their concern is keeping students engaged rather than in serious career exploration.*
- *The middle school is SUPPOSED to be doing Level I.*
- *Level I is too general to be called competencies.*
- *Some students come in well prepared for the next level while some students have no foundation. Consistency is important at all levels.*
- *Should be more of a knowledge base than exploratory.*
- *This model presupposes that the Level I course will be taught to 7th and/or 8th graders. In a non-unified district, Level I has to be taught to 9th graders that does not allow for much exploratory teaching at Level II. Also, as students are allowed to "sample" different courses depending on their grade level alone, it is difficult to provide a coherent sequence of instruction to all students.*
- *Have no idea what the 7th & 8th grades are being taught.*
- *We need more exploratory levels in high school.*

8. Specific Concerns with Level II

- *Level II is addressed, but in reality, it does not take two years to do Level II so our tenth graders are kind of in limbo. We usually schedule the 10th graders into Level III courses just because we don't have anywhere else to put them.*

- *Model is outdated. Level II is unnecessary class that is difficult for students to take considering all the required classes that they now are forced to enroll in.*
- *The state model is a pyramid. This means that the second level courses are quite small in number. Often our district leans toward cutting these courses or assigning additional duties due to low enrollments.*
- *In certain programs, Level II isn't working.*
- *Other electives and required courses compete for students. If student didn't get Level II, we are supposed to document they got them in Level III. Many Level II competencies are not critical to success in the Level III program.*
- *New academic requirements and graduation requirements make it difficult to have a viable Level II for all Level III areas. I don't feel we can do justice to that level and make it a true bridge to Level III for all students. Another difficulty comes into play when you have several different districts feeding into your high school Level II and III.*
- *Having personnel to provide Level II experience.*
- *Program teachers have to devote a tremendous time to Level II.*
- *Level II competencies can be taught in the basic courses. In reality Level II is an unfunded mandate due to the fact that we are funded on 11th and 12th grade students only, but are required to offer classes especially for 9th and 10th graders."*
- *Level II does not make sense to people outside of our domain. There is no strong connection to Level 1 and the curriculum taught in most schools that I am aware of does not really prepare students for Level II or III.*
- *Level II should belong in elementary.*
- *Parts of Level II would be better delivered at the eighth grade level.*
- *At our school, parts of Level II would be better delivered at the 8th grade level. Also we have lots of 9th and 10th graders in our Level III classes.*
- *Eliminate Level II given limitations of our rural school and the fact that we don't receive funding for Level II.*

9. Reporting Concerns

- *Some schools rotate students on a nine-week basis which is appropriate, but becomes unwieldy in doing grades, scheduling and reporting to ADE.*
- *The amount of paperwork is terrible. Tracking students after graduation is difficult.*
- *Too much paperwork for CTE teachers in addition to regular classroom responsibilities.*
- *Teachers are not directly accountable for IVEP's and consider the effort a joke.*
- *System seems to be set up to increase paper work and keep teachers occupied on things other than teaching students, and to some degree, ignore student success.*

- *Created a huge burden on already overworked teachers.*
- *Another limitation is in tracking and reporting competencies. We now only have to report on Level III competencies, but we are still held accountable for students having obtained Level 1 and II competencies. This makes the tracking of competencies literally a nightmare for us.*
- *The logistical accountability requirements of the model make it cumbersome to implement, and yet allows some flexibility in delivery and record maintenance.*

Other concerns included lack of resources, particularly technology for Level I. A teacher noted that in her school students could take the class as an elective and not have to pass it in order to be promoted to the next grade.

Recommendations from Directors and Teachers

A few persons said *"no changes."* One said, *"Require Level I to be taught and documented to all 7th and/or 8th graders whether the district is unified. Require the Level I competency indicator lists be sent to the student's high school so a coherent sequence of instruction can be provided."* However, most respondents recommended changes to the current model. Some just wrote generic suggestions such as *"Provide more flexibility in the system."*

The recommendations from the survey responses are described as follows.

1. Eliminate Levels

A theme recurring in many of the surveys was expressed by this teacher: *"We know what our employers want, we deal with them on a daily basis. Let us decide what skills should be taught at what levels."* Comments included these:

- *Do away with the levels. It confuses the local administration. Some local schools still think Auto I is a Level I, not the first level of Level III. The CIP codes will differentiate the levels in reporting and curriculum frameworks.*
- *Define competencies and let the school curriculum committee place where they need to be taught.*
- *Get rid of the levels. Determine the general competencies for work preparation and the specific program competencies. Let districts decide how to deliver the competencies and when.*
- *Use the model as a guide and not try to conform to it so rigidly.*
- *Provide one set of competencies per program area and allow districts to deliver them where and when they wish.*
- *Eliminate the reference to grade level delivery. Designing courses and prescribing course content should be a local district decision. State*

should develop broad generalized far-reaching objectives that allow local districts the ability to structure their courses and delivery based upon local needs and constraints. Acknowledges faculty strengths and weaknesses.

- *Facilitate transitions that make sense for teens in public school settings. Highlight critical skills, not an overwhelming taxonomy of "competencies" that include everything but the kitchen sink and must be dragged out over arbitrary time frames.*
- *Tweak Level I and II competencies to fit the Level III programs...you would have happier instructors.*
- *Possibly an abbreviated model should be examined for schools that have limited staffing resources, particularly rural schools.*

Who teaches the levels was also a concern. One Director said, *"I would like to see a way to integrate the Level II competencies into required academic courses. This would enable us to help those classes become more relevant and help students focus on Level III areas of interest. If I understand the model, we can't do this on a large scale basis because to count as a Level II, we must have a CTE certified teacher- I can't get all of my science or math or English teachers certified in CTE but I know they are capable of teaching a course in their field with a focus on applying the skills in a career area."*

2. Eliminate One Level

While there were several who recommended eliminating one level, the strategies varied. The most common responses were to combine Levels I and II and to eliminate Level II. Specifically, several suggested eliminating Level II as a requirement for Level III:

- *Only have two levels and do a better job of developing competencies.*
- *Combine Levels I and II.*
- *Eliminate Level II as requirement for Level III.*
- *Start with Level II – program specific basics.*
- *Move the model up to high school so that it could be under the control of one school and/or group of individuals.*

Several suggested offering Level I classes (or some of Level I classes) at the high school.

3. Eliminate Two Levels

- *I would build in the Level 1 and II competencies into what we know now as Level III. In many instances as program competencies are being reviewed and revised, it appears that this is already happening, although I know that some of the Level II areas are now up for review, again making it difficult*

for us to keep current on curriculum revisions, when what would seem the basis for Level III curriculum - those Level II competencies – are being revised after the Level III, not before. The whole process becomes somewhat redundant and convoluted.

- *Allow more flexibility in the Level II classes. If students have had any of the Level II classes, I would allow the class to count for any of the programs.*
- *Allow the Level II competencies, in certain programs, to be taught together with the Level III competencies. Students are not able to take as many electives today because of the recent AIMS academic requirements and increases in district graduation requirements. Therefore, I am finding fewer students taking the Level II courses. Besides, in some programs, the Level II competencies are "weak."*
- *Level I and II should be built into Level III. Some of the Level II designations for particular Level III programs don't make sense. They are arbitrarily assigned.   Example: BITS doesn't allow the Industry Tech Level II, although there is a direct competency correlation.*
- *As we move to more generalized programs, Levels I and II need to be included in the now more generalized Level III programs.*

4. Permit and Fund Tenth Graders in Level III Classes

A significant number of respondents recommended including—and funding---tenth graders in what are now Level III classes:

- *Allow 10th graders to take Level III classes. As it is, our students cannot take a business or computer course their sophomore year. They miss that year and sometimes don't come back to our program. This will serve our community well also since most of our seniors are taking college classes or are working.*
- *Once you get to your Level III courses you have lost a large number of students along the way if you are only allowing those that have taken the Level I and II courses into your Level III classes. If you want your section to make at your school, a number of times you allow those students that have not gone through the proper course sequence into the class just so the class will have enough students to continue to be offered.*
- *Make Level 1 for grades 7-8; Level II for 9; and Level III for grades 10-12.*
- *Make Level III 10th – 12th grades to simplify the implementation process, accountability, and comparability systems.*
- *Enable students to access Level III in sophomore year and an internship program in Grade 12. We create a "holding pattern" for sophomore students--thus, often losing their interest.*
- *Allow students to take Level III as sophomores so that we can provide a true sequence, often the students stay in the program for three years and they get a more rounded education than they would have otherwise. The*

state penalizes us for allowing students into the class as sophomores. If a student chooses to be part of the co-op program, they only have to have one year of actual class training and the second year is as a co-op student. The extra year of training is very beneficial. This also allows students to determine if they actually like the program and if they don't, they may be able to move on to another program and be a completer there.

- *Often sophomores are capable and desirous of taking the junior and senior classes and need to be given the opportunity.*
- *A succinct two-year program able to be achieved at the 10th and 11th grade level or at the 11th and 12th grade level, both with funding. Many students want to start program competency attainment at 10th grade, but the district is not compensated for that grade level. Some students often find they are deficient in an academic area during the senior year and this graduation requirement eliminates CTE classes.*
- *Some students are ready for Level III classes and this should be recognized.*

5. Improve Curriculum Development Process

- *Reduce the number of competencies. Decide what we want to do and do it well.*
- *When competencies are developed, be sure you have a group of people involved that will be teaching those competencies, especially rural teachers. Our facilities are limited in many ways and it is very hard for us to address some of the components.*
- *Make competencies more relevant to today's high school student and current job market.*
- *Have only workplace skills as skills common to all programs. The other six new common core competencies are being foisted upon us and are NOT equally appropriate for all programs.*

6. Streamline Data-Tracking and Reporting System

- *Eliminate paperwork.*
- *Consider other ways to document students' achievement.*
    - *Make it easier for teachers; we spend hours and hours doing the IVEPs and competencies. Even with the great software, it is time we don't have with this many students.*
    - *Decrease red tape and paper work or increase money for schools to hire a clerk for this task.*
    - *Track some of the program competencies outside the specific classes that are listed as acceptable within the current guidelines. There are several of the general competencies that are taught in*

other classes at the school. I would like to be able to track those by student, and thereby reduce the number of competencies that must be covered in our Level I and Level II courses.

7. Investigate Technical Testing

- *Certification in the areas is a must though. They need to have a concrete result of their endeavors.*
- *Maybe we need to develop some pre-and post-testing for career education. I would love to help develop something like that.*
- *State should move toward an assessment system to evaluate competency attainment. It should not be as important HOW students arrived at the end and were successful. It should be more important THEY ARRIVED and were successful.*

8. Explore New Schedule Opportunities

- *Look at more block schedules in order to fully teach and reinforce all of the competencies. Also maybe look at more joint vocational districts with some financial incentive to the districts to do that and not lay the burden on the taxpayer.*
- *Encourage more schools to go with block scheduling to increase time available for electives. Those schools that have block scheduling require up to 23 credits for graduation.*

9. Increase Staff Development

- *Need more staff development. We don't see best practices in CTE in our state or from other states. Arizona talks it, but we do not do it.*
- *Need staff development – increasing academics in CTE*
- *We need accountability, we need quality, we have confused both with paper work, we should concentrate our efforts on teaching (curriculum) equipment, and facilities.*
- *Maximize the intent of the AZ model. I have not seen training of staff and teachers for ten years. Is the model just on the books or are we following the intent?*
- *Hard to find teachers expert in Level III areas.*
- *Maybe half of our CTE staff is unable or not trained to deliver academic skills in our classes. Universities need to train incoming teachers on delivery of academic skills in the CTE areas.*

Other Comments

- *We should encourage innovation, new programs, modernization, and quality improvement. What work has been done to assist a systematic change in thinking with teacher preparation (University), industry input, School Boards, Administration? My work shows me that those groups have no understanding of the current status or requirements of CTE. We have a whole new system for CTE in Arizona; it is called "Joint Technical Education Districts." ADE has made no effort to use these districts, bring them into the fold or use their funding capabilities. They will be our salvation for the future if done correctly and can provide far more money than ADE has ever provided.*
- *Do not keep creating all these different career programs that pull from our existing ones (Academies-NAF) and overlap.*
- *In addition, I would recommend that the state seriously consider the potential for moving in the direction of area technical centers that seamlessly integrate and serve Grade 10-14 academic and CTE skills via a delivery model that facilitates rather than constrains, rewards rather than penalizes. If we actually looked at models that work, rather than "protected our own Arizona model" or re-invented what Arizona thinks is a better wheel, we might see that we've been on the wrong course for many years, trying to fit a square peg into a black hole. Many other states have very viable and valuable CTE systems. Then, there's Arizona, yet again at the bottom.*
- *I would like to see brief guidelines for new CTE teachers and/or directors for quick reference in setting up or maintaining effective programs. Acronyms would be spelled out for those who have not been exposed to their meanings and the process of CTE.*

Focus Group Results

CTE Directors

Following the survey, the researcher provided a summary of the data and conducted two focus groups. A randomly selected group of ten CTE directors participated on February 25, 2003 in Mesa, Arizona. See Appendix D and Appendix E for focus group protocol and data.

Following are the top five recommendations from the CTE Director focus group:

1. Eliminate the current model with levels; identify competencies for a career pathway but focus on Level III only for accountability and funding.

2. Fund tenth graders in Level III.

3. Replace the current competency tracking system with assessments that could be end-of-program technical assessments or industry certification depending upon the program area.

4. Use data to demonstrate how CTE contributes to academic achievement.

5. Study exemplary models from other states and the four-year model from Agriculture in Arizona.

CTED Staff

The survey summary was shared with the CTED staff prior to a second focus group on February 26, 2003. Following are the prioritized recommendations from the 19 CTE Division staff:

1. Define programs based on national skill standards and develop end-of-program technical assessments or identify industry certification examinations to assess measurable outcomes.

2. Define the mission of CTE with a vision for the next five to ten years. Incorporate into the development of a state strategic plan for CTE.

3. Move to a competency-based system instead of the current model of three levels.

4. Strengthen the current foundation program, including career development at the elementary and middle school levels.

5. Eliminate the model and restructure based on exemplary models from other states.

6. Combine Level I and Level II but require a coherent sequence in what is now Level III. Discussion included the suggestion to provide state leadership and instructional resources for what is currently Level I and II but to require state accountability and funding for Level III only. The combined item also included the recommendation for funding for tenth graders in Level III, although there was some concern that this would dilute total funding to schools and would be particularly detrimental to rural schools.

Summary

Overall, 119 surveys from CTE directors and teachers representing the 15 counties and 65 school districts were analyzed. The consensus throughout the responses from directors and teachers was that the Arizona CTE delivery model

provides for a coherent sequence of courses. However, in almost every case there was a qualifier. The model is good in theory, but not in practice. Another strength is the consistency it provides among districts and for state reporting.

The ratings reflect that it is being implemented to a fairly high degree. Respondents attribute this to the funding requirements. However, there were a large number of issues raised and some degree of agreement on recommendations to improve the system.

The major concern was the rigidity in the model. It is not flexible enough to meet the diverse needs of local school districts, particularly rural districts. The model was viewed as limiting student access to CTE, particularly given increasing and competing demands for student time from coursework, preparation, and remediation for the AIMS testing. Scheduling concerns were noted as well.

Competencies for Level I and II were described as weak and "too general." Survey respondents did not believe that Level I helped students achieve a career focus.

A significant number of directors and teachers expressed concern about the lack of oversight over junior high and middle schools. In many cases, Level I was not being taught there. Directors did not want to be responsible for instruction over which they had no control. Teachers said they had students coming from different feeder schools with differing instruction, but they were responsible for tracking competencies. Some noted that the system worked better in a unified school district.

Level II seems to be ambiguous in concept and did not have sufficient content for the time frames suggested. Most thought Level II should be combined with what is now Level III (or in some cases with Level I) or be eliminated.

The recommendations for change were consistent from the four sources: (1) CTE teacher survey data, (2) CTE director survey data; (3) CTE director focus group; (4) CTED staff.   The recommendation was to eliminate the levels and for the CTED to define the competencies and let schools choose how and at what grades to deliver the instruction.

Some directors recognized that if the current competency tracking is eliminated, that there must be another assessment system to evaluate competency attainment. Some directors said that the current competency tracking system is meaningless and said they would support a system of technical assessments and/or industry certifications. As one said, it should not be as important how students arrived, but that they arrived. The top recommendation from CTED staff was to define programs based on national skill standards and to develop end-of-program technical assessments or identify industry certification examinations to assess measurable outcomes.

Several respondents, including both focus groups, suggested combining Levels I and II and not including those levels in the state accountability system. The recommendation that seemed to have the most agreement among teachers and directors was to permit and fund tenth graders in Level III classes. That recommendation had some support in the Division as well. There was strong support for focusing CTE, including state accountability, on what is currently Level III and to provide a coherent sequence of courses for those students selecting a career major or pathway.

There was a shared belief that the foundation level is important and that career development is vital as a foundation for students making informed career choices. It was suggested that counselors should be involved in analyzing and implementing the recommendations from this report.

Other recommendations included assuring that there is provision for some input from practitioners in the curriculum development process and streamlining the data and reporting system. There were several requests related to staff development, including learning about best practices in CTE in Arizona and from other states. Respondents also noted a specific need for staff development in increasing academics in CTE. Some others noted the need to evaluate scheduling options in order to provide more time for CTE. Both focus groups suggested studying exemplary models from other states.

CTED staff recognized the need for engaging a broad array of stakeholders to revisit the mission and vision of CTE in Arizona and to develop a strategic plan. The delivery system for CTE in Arizona should maximize options for students within a framework of rigorous standards. Cohen (2001), in a paper prepared for Jobs for the Future and the Aspen Institute, said:

> *To help all students reach common, high standards, the one-size-fits-all approach of today's high school must yield to a system that presumes students will learn through different pedagogies, institutional arrangements, and amounts of time. The current education system, including high schools, provides students with a constant amount of time and a single approach for learning—and produces unacceptably large variations in student performance….We must provide students with multiple learning options and pathways and varied lengths of time to complete high school and gain the skills necessary to enter post-secondary education without remediation.* (p.6)

Chapter 8
Criteria and Components of a Quality
Career Technical Education Program

> ### *Good is the enemy of great.*
>
> J. Collins in *Good to Great*

The essential questions for Chapter 8 are: *What distinguishes a "good" CTE program from a "great" CTE program?* What are the components and the criteria for a quality CTE program? State and local CTE systems can have a well stated mission, a set of standards, and be in compliance with accountability regulations and yet not be a *"great"* system.

This chapter will address criteria for program approval and assessment from selected states deemed to have coherent systems of CTE. The exemplary CTE program criteria from the NDCCTE programs are included and recommended.

The second section will discuss the value of external networks for school improvement, featuring High Schools That Work as a high school improvement initiative with a focus on CTE.

The third section of the chapter will focus on staff development, recognizing that teachers make the greatest difference in student achievement. The increasing need for strong leaders in CTE is also acknowledged.

State Comparisons of Program Approval or Assessment Guidelines

Arizona's local program assessment is based upon five performance pillars:

1. Program Assessment, Information, and Analysis
   - Effective selection and use of data to support program goals
   - Using student assessment and program evaluation data to continuously improve curriculum and instruction
   - Program uses a variety of program assessment strategies

2. Staff Development
   - Staff development emphasizes student learning, achievement, and performance.
   - Program instruction addresses relevant academic skills in relationship to state standards.

- Program instruction addresses the relevant industry standards in relation to vocational-technical education (VTE) state competencies.

3. Rigorous VTE and Academic Studies
   - Program activities focus on student learning and achievement practices and continually review and improve.
   - Set values and expectations that promote student success.

4. Contextual and Experiential Learning
   - Students will have access to an articulated program that results in an industry recognized credential and employment in a career pathway.
   - Students learn about postsecondary opportunities through experience.

5. Strategic Planning
   - Puts plans into action
   - Focuses on alignment in key learning strategies and measurements

Four state models of quality indicators for program approval or review follow.

Oklahoma

Oklahoma has 12 School-to-Work school site quality indicators:

1. Career development
   a. Career awareness and exploration activities
   b. Career pathways/majors/clusters
   c. Guidance counselors in STW systems
2. Curriculum standards
   a. Skill standards
   b. STW systems based on high academic standards
3. Integrated curriculum
4. Business/industry and community relationships
   a. Engaging organized labor and employee associations
   b. Comprehensive employer involvement in STW activities
   c. Intermediary/connecting activities
5. Work-based learning
   a. Work-based learning experiences
   b. Work-site employee training
   c. Liability, health and safety issues
   d. School-based enterprises
6. All aspects of the industry
7. Teaching all students
   a. Involving every student
   b. Serving out-of-school youth
8. Instructional technology

9. Postsecondary involvement
10. STW local school site plan
    a. STW data assessment
    b. STW activities in elementary schools
    c. STW activities in middle schools
    d. STW activities in high schools
11. Professional development planning
    a. Professional development planning
    b. Worksite experiences for teachers
12. Local STW partnership development

South Carolina

South Carolina developed a set of Quality Review Measures aligned with its *2020 Vision for Career and Technology Education for South Carolina.* School districts, schools and centers are required to use the Quality Review Measures to make an annual review of programs. Standards are organized into four categories: school district administration, school administration, student services, and curriculum and instruction.

The two sets of administration measures include criteria for comprehensive needs assessment; local advisory council; local plan; local school-to-work advisory committee; training in applied methodology; SCANS instruction; career majors; school-to-work program; professional development program; annual state standards assessment; annual review; articulation agreement; Tech Prep program; evaluation of career and technology programs; school-to-work coordination within/between schools; administrative, guidance and support staff; financial support; SCANS; and inventory.

The other sets of standards relate to student services and curriculum and instruction and include a comprehensive career development program; barriers to enrollment; non-traditional programs; individual career plans; placement services; budget; reports; competency-based instruction; integration of instruction; school-to-work; advisory committee; supplies and materials; community resources; student organizations; equipment; facilities; safety; and placement.

Oregon

Oregon has defined ten criteria for its Professional Technical Education (PTE) programs: curriculum, instruction, and student evaluation; PTE student leadership organizations/opportunities; student access to programs; post-secondary connections; comprehensive guidance; long range vision/plan; business, community and education partnerships; administrative support and

leadership; teacher preparation and licensure; and professional development.

New York

New York offers flexibility to schools in allowing students to take integrated or specialized courses but requires school districts and Boards of Cooperative Education Services (BOCES) to engage in a program approval application process that includes a self study report and review by an external team. The review (*New York* State Education Department 2001) consists of seven categories: curriculum, teacher certification/ training, technical assessments based on industry standards, postsecondary articulation, work-based learning, work-skills employability profile, and program information (brochures, flyers for program awareness).

NDCCTE Criteria for Exemplary CTE Programs

The most recent and comprehensive set of criteria for CTE programs was developed by the NDCCTE (2003) for CTE with input from a national advisory committee comprised of experts in CTE. These criteria reflect national legislation, such as Perkins III and the National Skill Standards Act of 1994, and national reform efforts such as Tech Prep and High Schools That Work. These criteria also reflect the Office of Educational Research and Improvement, U.S. Department of Education standards in regard to program quality, evidence of effectiveness and success, educational significance, and replicability.

The promising practices are defined in these areas:

- **Access and inclusiveness.** Strong CTE programs show a commitment to making sure that students of varied backgrounds are able to enroll, participate, and learn effectively. Focusing on inclusiveness can greatly enhance nontraditional students' experiences, in and out of the classroom.
- **Alignment with standards.** Using industry-defined and recognized skill standards for major occupations helps to insure that students are learning the skills, hard and soft, needed to be effective in the workplace. The use of academic standards in curriculum development helps students to obtain a well-rounded learning experience and prepare for further education.
- **Certification and credentialing**. In today's "knowledge economy," CTE programs provide valuable job-related certifications and academic credentials. High quality programs continually update and expand the types of training, certificates, and credentials provided in order to produce sought-after workers.
- **Curriculum reform.** Preparing students for the challenges of the workplace often requires that CTE programs rethink and refine their curricula. New curriculum content and teaching strategies ask that students not only master

factual knowledge but also learn to apply it in real situations and by solving novel problems.

- **Evaluation and continuous improvement**. Evaluating and monitoring CTE programs' progress, addressing shortcomings, and improving overall program quality is critical to advancing the field. A system for making continuous improvements results in programs that are effective in enhancing students' learning as well as their performance on the job and in future education.
- **Placement and retention**. Preparing every student for a successful career is central to CTE. Today's students will graduate into a far more complicated and challenging workplace than ever before. Our educational system must keep up with the changing times, ensuring employability and an ability to adapt, as workforce needs change.
- **Partnerships**. Fostering collaboration among employers, educators, and government agencies is increasingly important for CTE programs. Leveraging partnerships and creating win-win situations can result in new funding sources, collaborative curriculum development, and student employment opportunities.
- **Professional development**. Keeping abreast of new developments in education, industry, and the world allows CTE instructors, counselors, and administrators to be effective. Exemplary programs offer staff a range of opportunities to stay current, usually including work-based learning experiences.
- **Program and instructional delivery**. Exemplary programs use unique and innovative program models that can be effectively replicated in other settings. Program and instructional approaches that have been proven to work are especially helpful to others.
- **Program and institutional leadership.** Strong, proactive program and institutional leadership is critical to long-term program success. Improving program design, teaching, and partnerships, and integration with the institution's strategic plan are ways to ensure program sustainability.
- **Technology enhancements**. Technology is an integral part of our daily lives and vital in the workplace. Integrating technology into CTE is imperative to the success of students and of the program itself. Through distance learning, state-of-the-art labs, use of the Internet, and other means, programs can reach their potential, overcoming limitations in size, location, and costs.
- **Transition options**. Linkages between secondary and postsecondary education systems can help students to obtain the instruction they need at each level, without encountering barriers or requiring remediation. Outstanding CTE programs take a holistic look at student learning needs and form partnerships with other educational institutions that contribute to successful student transitions.
- **Student development and leadership**. Students need guidance to make informed decisions about their education and careers. Excellent guidance systems are a vital part of great CTE programs. Opportunities for students to take on leadership roles can strengthen both the program and the students.

- **Sustainability and finances**. Program sustainability and financial health go hand in hand. Comprehensive multi-year planning and well thought-out funding strategies help to insure a sustainable program. Innovative funding strategies can be replicated by other CTE programs seeking to assure the future.
- **Systemic and whole school reform**. Playing a role in changing educational structures and practices for a broad range of students can be an extra contribution of a forward-thinking CTE program. Likewise, institution-wide reform efforts may provide a foundation for excellence in CTE.

Rationale for Whole School Reform

Castellano, Stringfield, and Stone (2002) described whole-school reform as *"efforts to restructure the organization of a school and the priorities of instruction so that a particular, unified vision of an improved school pervades the school."* Forty years of research have demonstrated that school reforms are much more likely to have long-term impacts on student achievement if the change effort involves a school wide focus.

The researchers noted that an overarching finding from research on whole-school reform has been that locally developed reform efforts tend to begin with a flurry of committees and design work but *rarely* moved to actual classroom implementation. For this reason, many schools have adopted externally developed reform designs. This direction is also spurred by the Comprehensive School Reform (CSR) grants issued by the U.S. Department of Education. In some states, funding has been provided at the high school level. (HSTW is one of the approved reform models for CSR.)

In a comprehensive study of school reform, Nunnery (1998) said that local development was riskier and costlier than implementation of externally designed models. For this reason, externally developed reform designs were recommended. It was recognized that most schools would adapt these designs to their own contexts, histories, and desires to change. However, the schools had access to external supports and resources. Nunnery noted that when problems occurred in schools attempting local reform, effort was diverted from implementation to development, resulting in changes that were expensive in terms of staff effort. Teachers experienced higher levels of frustration and anxiety in designs calling for a great deal of local development.

Nunnery also said that teacher ownership of a reform had less to do with where a program was developed than whether the program worked. People changed more easily when the change helped them solve problems that are real to them. The chief criticism of reform models was that too often they offered up ideas but did not deliver the models with sufficient clarity of support.

High School Reform Initiatives

The Southern Regional Education Board's (SREB) High Schools That Work initiative is the nation's largest and fastest-growing effort to combine challenging academic courses and modern career technical studies to raise the achievement of high school students. The SREB-State Vocational Education Consortium, a partnership of states, school systems, and school sites, established the initiative in 1987. The 1100 schools and 27 states in the network adopted the belief that most students can master complex academic and technical concepts if schools foster a supportive environment.

Figure 5
High Schools That Work States

High Schools That Work Key Practices

High School That Work specifies these ten key practices:

- **High expectations.** Setting higher expectations and getting more students to meet them.
- **Career technical studies.** Increasing access to intellectually challenging career technical studies, with a major emphasis on using high-level mathematics, science, language arts and problem-solving skills in the modern workplace and in preparation for continued learning.
- **Academic studies.** Increasing access to academic studies that teach the essential concepts from the college preparatory curriculum by encouraging students to use academic content and skills to address real-world projects and problems.
- **Program of study.** Having students complete a challenging program of study with an upgraded academic core and a major.
- **Work-based learning.** Giving students and their parents the choice of a system that integrates school-based and work-based learning. The system should span high school and postsecondary studies and should be planned by educators, employers and employees.

- **Teachers working together.** Having an organization, structure and schedule giving academic and technical teachers the time to plan and deliver integrated instruction aimed at teaching high-level academic and technical content.
- **Guidance.** Involving each student and his or her parents in a guidance and advising system that ensures the completion of an accelerated program of study with an in-depth academic or vocational-technical major.
- **Extra help.** Providing a structured system of extra help to enable students who may lack adequate preparation to complete an accelerated program of study that includes high-level academic and technical content.
- **Keeping score.** Using student assessment and program evaluation data to improve continuously the school climate, organization, management, curricula and instruction to advance student learning and to recognize students who meet both curriculum and performance goals.

High Schools That Work Research

In addition to the extensive database maintained by HSTW, there have been external studies as well. A Northwest Regional Education Lab (1999) publication of school reform models concluded, *"schools that implement the model faithfully usually see improved student achievement, and higher rates of attendance, graduation, retention, and postsecondary enrollment.* " Kaufman et al. (2000) say that improvement on the HSTW assessment, based on the NAEP tests, has occurred.

The American Institutes for Research (AIR 1999), under contract to a coalition of educational organizations, including the American Association of School Administrators, American Federation of Teachers, National Association of Elementary School Principals, National Association of Secondary School Principals, and National Education Association, published comparison data on school-wide reform initiatives. They evaluated the relative strengths of the approaches to reform in three areas: (1) evidence of effects on students, (2) developer support of implementation, and (3) costs.

To determine evidence of effects on students, AIR evaluated the amount of rigorous research and the strength of the research findings. All studies on outcomes included unpublished studies, but not anecdotal data, and were reviewed against a set of standards for evaluating the quality of the study. These standards included the size and type of the sample, use of comparison groups, and use of statistical analysis. AIR reported findings only from studies that met minimum criteria for methodological rigor.

AIR found that of the 24 reforms studied, few met its criteria and had assessed results with empirical data. Based on the studies that met these criteria, the approaches to school-wide reform with the strongest evidence of effect on

student performance were Direct Instruction, HSTW, and Success for All. Only HSTW is designed for high school reform. While HSTW addresses whole high school reform, it specifically embraces career technical education in its key practices. It advocates higher standards for all students, including career technical education students.

Jennings and Rentner (1998) said that HSTW was an excellent model that should be available to students everywhere in the country. They noted that HSTW demanded an end to the general track and integrated academic and vocational education.

Other Reform Initiatives

The Talent Development High School (2003) with career academies, developed at Johns Hopkins University, is a comprehensive reform model for large high schools that face serious problems with student attendance, discipline, achievement scores, and dropout rates. Several schools have used the Talent Development model to implement ninth-grade academies. These academies are formed with 120 to 180 students and four to six teachers, enabling teachers to get to know their students. The Talent Development model also calls for career academies for the upper grades, core curriculum in a four-period day, a catch-up curriculum and extra help, and an alternative after-hours program. Evaluations of Talent Development and other similar approaches show that, when well implemented, they can boost achievement and increase high school graduation rates (Cohen 2001).

Castellano, Stringfield, and Stone (2002) examined promising programs for integrating CTE with whole school reforms in schools that serve predominantly disadvantaged students. They hypothesized that compared to other types of CTE -based whole school reforms, curriculum integration was easier to implement in high schools that have reorganized into academies or some other structure that was defined by interdisciplinary teacher teams. Teacher teams were integral to the reform. They also found that strong leadership was a crucial factor in effecting change. Strong principals and others leaders were critical in setting an agenda and the tone for change. All were able to secure additional funding which was necessary because professional development, and student materials were consistently beyond what the basic school budget could provide. Principal turnover was an issue. The next phase of the study will be attentive to the extent to which the reforms have been institutionalized and how well they survive and evolve after changes in leadership.

CTE Teacher and Administrator Development

Teacher Development

A growing body of research confirms what we have known all along: Good teaching makes a difference.

Teacher effectiveness is the single biggest factor influencing gains in achievement, an influence many times greater than poverty or per-pupil expenditures. Studies in Tennessee found that students who had good teachers three years consecutively showed a significant increase on test scores. On the other hand, students who began at exactly the same percentile score and who had a series of ineffective teachers during that same period showed a significant decrease (Wright, Horn & Sanders 1997).

Teaching is complex and demanding--career technical teaching particularly so. Career technical teachers need both academic *and* technical knowledge and skills.

Professional development provides the bridge from where teachers are to where they need to be to be effective in improving student achievement. In the 2000 HSTW survey, 9,185 career technical teachers (representing 30 percent of total teachers in the survey) cited the following areas staff development needs:

- 49 percent reported a need for teaching methods that motivate students to do a variety of demanding projects, reports and presentations.
- 47 percent reported a need for planning and developing curriculum based on workplace experiences outside of school.

In the HSTW survey, career technical teachers also indicated that they had received *no* staff development in the past three years on these topics:

- 70 percent received no staff development for getting career-bound students to master complex content in algebra, geometry, and statistics.
- 64 percent received no staff development for teaching science in an applied or occupational context.

Ohio has been recognized for its systematic implementation of High Schools That Work. *Ohio* adopted HSTW in 1998 and the number of schools interested in this school improvement model grew rapidly. In the beginning, a year-long HSTW Academy with monthly seminars, site visits, and participation in state and national staff development conferences was implemented to create high-performing sites for replication. The HSTW Academy curriculum focused on the goals and key practices of HSTW as well as aligning instruction with the new state academic content standards and assessments.

As the number of sites grew beyond capacity of the state office to deliver expected services, four regions were created. A regional coordinator and additional consultants staff each of the four regional offices. The regions and the state office partner for statewide professional development experiences. The regions provide site-specific staff development and content needed by a majority of the sites within each region. School district and site administrators are expected to participate with academic and career technical teacher teams in each of the offerings.

The following staff development principles have been applied in the *Ohio* model:

- **Focused.** Professional development focuses on school-specific problems around the HSTW key practices.
- **Sustained.** From 1999 through 2003, the professional development offerings have been planned, conducted, monitored, and improved.
- **Data-driven needs.** School, state, and national data sets have provided information for recommendations and decisions to improve student achievement.
- **School team oriented.** Academic and technical teachers in high schools and middle grades, superintendents, district office staff, and building administrators have been expected to participate. Community college and university faculty, parents, advisory committee members, and board of education members are encouraged to contribute to the team effort.
- **Supported.** Federal Perkins dollars, state budget line item allocations, and school district resources have supported the professional development series. The State Superintendent, the Offices of Curriculum and Assessment, and Career Technical Education support HSTW professional development activities and communicate consistent messages.
- **Community of learners.** School teams have opportunities to learn and to share with other school teams across districts, regions, Ohio, and the nation.

The region and state co-sponsored experiences have culminated in participation at the *Ohio* High School Improvement Institute, a two-day conference with school team members working together. The Institute has been organized around themes that bring together academic content, career pathways, tech prep, and HSTW. An additional expectation within the annual professional development calendar is school team participation in the HSTW Annual National Staff Development Conference each summer.

Key principles for quality staff development (Kister 2002) call for staff development to meet these characteristics:

- Based on data or a gap analysis of needs

- Connected to a comprehensive change process or school improvement plans
- Continuous and sustained over time
- Focused on site-specific training with opportunities for coaching, practice, and sharing of student work

A large-scale study found that every additional dollar spent on more highly qualified teachers netted greater increases in student achievement than did any other use of school resources (Ferguson 1991). A wide range of strategies in addition to traditional workshops and summer institutes may be considered to meet the professional development needs of career technical teachers: on-site coaching, study groups, graduate coursework, instructional supervision, observation of master teachers or model programs at work, and participation in professional networks or curriculum development work (Hirsch, Koppich, & Knapp 2001). Externships, in which teachers participate in work activities and observe how academic and technical skills are used in the workplace, are highly recommended for career technical teachers.

An example of a focused professional development model is that of *Project Lead the Way* (PLTW) (2003). *Project Lead the Way* is a four-year sequence of courses which, when combined with college preparatory mathematics and science courses in high school, introduces students to the scope, rigor, and discipline of engineering and engineering technology prior to entering college. The intensive, comprehensive teacher training program consists of a pre-assessment in which PLTW staff analyze results and recommend work to prepare faculty for the summer institute. The summer institute is an intensive two-week training program that prepares teachers to teach the course. Teachers then receive continuous support through electronic communication among teachers and staff. The National Academy Foundation and the Automotive Youth Educational Systems are other examples of curricular programs that provide or require focused professional development for CTE.

National Board for Professional Teaching Standards

The National Board for Professional Teaching Standards (NBPTS) was established to set high and rigorous standards for what accomplished teachers should know and be able to do. NBTS measures a teacher's practice against high and rigorous standards. The process is an extensive series of performance-based assessments that includes teaching portfolios, student work samples, videotapes and thorough analyses of the candidates' classroom teaching and student learning. Teachers also complete a series of written exercises that probe the depth of their subject-matter knowledge, as well as their understanding of how to teach those subjects to their students.

Based on professional consensus, the Board defined thirteen standards (NBPTS 1997) for career technical teachers:

- Knowledge of students
- Knowledge of subject matter
- Learning environment
- Diversity
- Advancing knowledge of career technical subject matter
- Assessment
- Workplace readiness
- Managing and balancing multiple life roles
- Social development
- Reflective practice
- Collaborative partnerships
- Contributions to the education profession
- Family and community partnerships

North Carolina has been a leader in the number of National Board teachers, certifying 104 CTE teachers last year. *North Carolina* provides a 12 percent salary increase to teachers' state-paid salary for those who achieve National Board Certification. They also pay the fee for up to 1,500 teachers who complete the National Board Certification process and provide up to three days of release time for candidates to work on their portfolios and prepare for the assessment center exercises.

According to the National Board website, Arizona certified one CTE teacher in 2002.

Administrator Development

There is also a crisis in educational leadership of both quality and quantity. School leadership is currently the focus of several large-scale efforts by national education organizations. Gordon Ambach, former executive director of the Council of Chief State School Officers, said in an Education Week interview (Olson 2001):

> *There's been a lot of energy put into improving the quality of teaching the past few years. The states have not put nearly as much energy into improving the practice of school leaders.*

The role of principals and superintendents is to give leadership to improving the quality of career technical instruction – what is taught, how it is taught, what is expected of students, and the level of performance of students. SREB is developing a leadership curriculum designed to prepare principals, aspiring

leaders and teacher leaders to aggressively improve curriculum, instruction, and student achievement in their schools.

Administrators need to know how to create conditions for learning, including an organizational structure that facilitates career technical teachers working in teams with academic teachers, planning integrated lessons, and connecting what students are learning in academic classes to projects and applications in career technical classes.

Ohio, *Oklahoma*, and *Massachusetts* have state CTE leadership institutes to develop CTE leaders at the local and state levels. *Illinois* is starting a program this year modeled after *Ohio.* The specific goals of *the Ohio Career Technical Education Leadership Institute* (OCTELI) are as follows (Kister 2001):

- Assure an *adequate number* of high quality leaders with a commitment to the profession.
- Assure *continuity* of administrative leadership.
- Assure high-level administrator *performance, cost efficiency, and compliance* with relevant standards and regulations in program operations.
- Contribute *"intellectual capital"* to the state career technical education programs.
- Prepare career technical education *"statesmen"* who are both competent and comfortable in a variety of settings and jurisdictions.
- Provide the state office of career technical education with a *quick response network* that will rapidly mobilize talent, provide useful inputs, and marshal political support on key issues.
- Provide a *policy advisory network* to the office of career technical education by serving as a "sounding board" for policy options and program initiatives in the formative stages.

The twelve-month institute features four basic components: (1) ten monthly weekend seminars; (2) the development of an individual strategic plan; (3) mentoring to achieve the necessary competencies desired through the Individual strategic plan; and (4) network development among the Fellows. Assigned readings provide a context to support the monthly weekend seminars. It should be noted that the cohort group or networking is a key feature of professional leadership development.

The National Dissemination Center for Career Technical Education established a National Leadership Institute with the goals of developing leadership capability; establishing a vision and mission for career technical education; leading change; developing policy; and understanding culture.

Summary

This chapter addresses the "quality factor" for CTE. The first section includes program approval or assessment criteria for *Oklahoma*, *South Carolina, Oregon,* and *New York.* These state criteria were chosen because each state represents a coherent state CTE system and the criteria are recent.   *New York* is included because of its emphasis on technical assessments as part of the program approval process. Arizona should review the criteria for outstanding practices in CTE from the National Dissemination Center for Career and Technical Education and use those in prioritizing and determining the nature of the actions to take in improving its CTE system.

The second section highlights the relationship of CTE to high school reform and describes the High Schools That Work initiative. It is suggested that Arizona analyze the research on whole school reforms for the integration of CTE and the potential for tapping national networks to improve the quality of CTE programs at the program level.

The final section emphasizes the importance of staff development and includes guidelines for schools to develop a system of professional development. *Ohio's* process to implement HSTW as a school improvement initiative is described. It is recommended that Arizona promote the National Board of Professional Teaching Standards for CTE teachers and pursue state policies that support teachers in attaining the standards.

The importance of strong leadership for CTE is also stressed and *Ohio's* model for developing CTE leaders is described. Arizona is encouraged to develop a statewide commitment for recruiting and training CTE leaders and to consider supporting participation in the National Leadership Institute.

Chapter 9
State Profiles and Best Practices

In addition to a review of national CTE research and literature and the survey of Arizona CTE educators, a third component of this study was to benchmark states with CTE best practices. The essential question is: What can be learned from states with CTE best practices that would benefit the CTE system in Arizona?

The researcher interviewed policy leaders and researchers, and drew from experiences working with state leaders to determine states and practices to profile. Some state systems are comprehensively profiled. Outstanding CTE components in other states are described.

Note that sources are state websites unless otherwise indicated.

Profiles and Practices

Arkansas

Best practice. Concurrent enrollment in secondary centers sponsored by technical or two-year colleges

Concurrent enrollment. In 2001, *Arkansas* had over 1,000 students participating in concurrent enrollment to receive credit in career technical courses at seven four-year universities and 23 two-year colleges. Currently, *Arkansas* has 19 secondary centers, including two sponsored by technical institutes and six by two-year colleges. The five most frequently offered career technical programs at secondary centers sponsored by colleges are automotive service technology, medical professional education, machine tool technology, microcomputer technology, and welding. A local director said, *"Having a secondary area vocational center on a college campus is a practical way to pool resources to provide high-quality technical education for high school juniors and* seniors."

Connecticut

Best practice. Technical assessment system

Technical assessment system. To improve the quality of CTE, the *Connecticut* State Department of Education, Bureau of Career and Adult Education, began the process of designing a statewide assessment system in 1998 (Hoag, 2002). In 2002, 87 percent (136) of all *Connecticut* high schools participated in the state

assessment in addition to other schools receiving Perkins funding. *Connecticut* uses NOCTI because of the flexibility provided in customizing and designing assessments specific to *Connecticut*'s performance standards and competencies. NOCTI convened national committees of subject matter experts from business, industry, and education to review, update, and validate all of *Connecticut*'s performance standards and competencies. The data that is generated by NOCTI is used for reporting purposes and serves as an important reference in the design of statewide professional development and the ongoing revision of local and state CTE curricula.

Florida

Best practice. State data system; scholarship (Gold Seal) program

State data system. The *Florida* Education and Training Placement Information Program, administered by the *Florida* Department of Education, compiles, maintains, and disseminates information on the educational histories, placement and employment, enlistments in the United States armed services, and other measures of success of former participants in state educational and workforce development programs. The system does not rely on survey data, but rather links with a number of state data systems for employment information.

Scholarship (Gold Seal) program. The *Florida* Gold Seal Vocational Scholars Award is one of three Bright Futures scholarships awarded (the others are academic and medallion). The scholarship provides 75 percent of tuition and fees in a *Florida* postsecondary institution (prorated for private institutions). Students must maintain a 3.0 GPA for the 15.5 core academic credits required and a 3.5 GPA in a minimum of three vocational credits in one vocational program. In addition, students must earn minimum scores on selected tests. *Florida* Bright Futures Scholarships, including the academic scholarships, totaled $174 million in 2000-01.

Georgia

Best practice. Access and elimination of general track; dual enrollment; apprenticeship program

Access and elimination of general track. The *Georgia* State Board of Education, in the mid-1990s, ended the general track and required all students to take a more demanding academic core and either a career focus or more advanced academic course. The state has witnessed an increase in the percentage of students completing the college-preparatory endorsement, the vocational endorsement, and the dual vocational and college-preparatory endorsement with the elimination of the general diploma. According to Bottoms

(2002), *Georgia* offers a compelling example of the power of strong state policy to affect achievement.

Dual enrollment.   *Georgia*'s dual enrollment-HOPE program offers additional educational opportunities for high school and enables them to receive the HOPE scholarship while earning credit from both the *Georgia* Department of Education secondary schools and the *Georgia* Department of Technical and Adult Education technical colleges. The dual enrollment program also allows high schools to receive full-time equivalent (FTE) funding for dually enrolled students.

Apprenticeship program. *Georgia* has an extensive youth apprenticeship program involving over 3,700 students and more than 2,500 participating employers. The Youth Apprenticeship program enables students to receive a high school diploma, a postsecondary certificate or degree, and a certification of industry-recognized competencies applicable to employment in a high-skill occupation.   Work-based learning includes the development of a detailed training plan between the employer and apprentice, identification of specific work tasks that will develop workplace competency, a minimum of 2,000 hours of on-the-job training with earnings based on a progressive wage schedule established by the participating employer, workplace mentoring, and instruction in general workplace competencies as well all aspects of a chosen industry. School-based learning includes a minimum of 144 classroom hours of related academic instruction, and selection of a career major by 11th grade.

Maryland

Best practice. Coherent CTE state system (with emphasis on integration of academics and CTE); integrated academic and CTE curriculum

Coherent CTE state system (with emphasis on integration of academic and CTE). The *Maryland* Career and Technology Division (2002) advanced the following vision, mission, goals, and components for CTE:

- Vision. All students graduate prepared for college and careers.
- CTE Mission. Provide instructional programs to increase the academic, technical and workplace skills of students in order to prepare them for careers and further education.
- Goals
    - Improving academic achievement in CTE
    - Increasing dual completers
    - Improving career readiness for all students
    - CTE teacher preparation and recruitment
- Components
    - Smaller learning communities (academy, pathway, major)
    - Scope and sequence

- The grouping of students and faculty
- Flexible scheduling and extended learning time (extra help for students)
- Advanced placement (AP), dual enrollment (options for college credit)
- Strong partnerships with elementary and middle school feeders and colleges/universities
- Extra support from adults (adult advocates, staff advisory systems, mentoring strategies, tutoring and other services)
- Active involvement of parents, business and the community

Integrated academic and CTE instruction. *Maryland's* CTE instruction is based upon a process that encourages teams of secondary academic and CTE teachers and others to work together to develop blended instruction projects. They link at least one core academic discipline and one of the ten career clusters identified as critical to *Maryland's* economic development. *Maryland* offered extensive staff development workshops to create the projects.

Massachusetts

Best practice. Certificate of Occupational Proficiency (technical assessment)

Certificate of Occupational Proficiency. The Education Reform Act of 1993 in *Massachusetts* created the Certificate of Occupational Proficiency to recognize students who successfully complete a comprehensive education and training program in a particular skill area and reflect a determination that the recipient has mastered a core of skills, competencies, and knowledge comparable to that possessed by students from the most educationally advanced education systems in the world. The project is in progress and has submitted nine programs to the Board of Education for approval. Proposed rules state that the Board will set minimum outcome standards for the percentage of vocational technical education students who receive a Certificate of Occupational Proficiency. A system of assessments is being developed.

Michigan

Best practice. Career pathways system.

Career pathways system. *Michigan* defines its *Career Preparation System* as *"a system of programs and strategies providing pupils with opportunities to prepare for success in careers of their choice."* Career pathways are a key strategy in the implementation of *Michigan's Career Preparation System.* Pathways help students make meaningful connections to six broad industry sectors that are reflective of the current and emerging world of work. A recent

study documented the implementation of career pathways in *Michigan.* Of the 97 districts completing surveys, 86 percent indicated they were in the process of implementation. The districts have subscribed to these components: educational development plans; internships; career classes; visits to businesses; job shadowing; final presentation; graduation requirement; portfolios; and teacher externships. The functions of a Career Pathways Specialist should be complementary with district curriculum development work and with those district administrators responsible for curriculum development and implementation. (Note that this system is further described in Chapter 4.)

New York

Best practice. CTE standards; integrated academic and CTE policy; technical endorsement on diploma

CTE standards. *New York* requires that curriculum meet the *Career Development and Occupational Studies Learning Standards* on a continuum to attainment of what would be comparable to Arizona's Level III competencies. Those standards are as follows:

- **Standard 1.** Students will be knowledgeable about the world of work, explore career options, and relate personal skills, aptitudes, and abilities to future career decisions.
- **Standard 2.** Students will demonstrate how academic knowledge and skills are applied in the workplace and other settings.
- **Standard 3a.** Students will demonstrate mastery of the foundation skills and competencies essential for success in the workplace.
- **Standard 3b.** Students who choose a career major will acquire the career-specific technical knowledge/skills necessary to progress toward gainful employment, career advancement, and success in postsecondary programs.

Integrated academic and CTE policy. *New York* offers flexibility to schools in allowing students to take integrated or specialized courses that combine academic and career technical skills and content. In order to make students eligible for that option, school districts and Boards of Cooperative Education Services (BOCES) are required to engage in a program approval application process. As noted in Chapter 5, technical assessments based on industry standards are required if schools choose to exercise this option.

New York provides for three options:

- Fully integrated approach with 3.5 CTE sequence credits and 4 CTE/integrated academic courses

- Specialized course approach with 3.5 CTE sequence credits and 4.0 CTE/specialized courses
- Combined approach with 3.5 CTE sequence credits and 4.0 CTE/combined integrated and specialized courses.

Specialized courses can be developed in English language arts, mathematics, science, and economics and government and applied to a range of CTE program areas. These courses, which combine both academic and technical skills and knowledge, are individual courses. Each specialized course fulfills both an academic requirement and a unit of study credit within a CTE sequence. Examples include anatomy and physiology (science), avionics (mathematics), and business communications (English language arts). The integrated course approach can provide the greatest flexibility. An integrated course delivers academic content within a CTE context. Examples include technical reading and report writing as part of an Automotive Technology course. These courses would be jointly planned and/or delivered by academic and/or CTE teachers.

Technical endorsement on diploma. To receive a technical endorsement on the Regents Diploma in *New York*, students must (1) complete all graduation requirements and CTE sequence requirements; (2) pass a technical assessment; and (3) pass the five required Regents examinations in English, mathematics, science, and social studies or alternatives approved by the State Assessment Panel (Kadamus 2001). Several BOCES and districts use the NOCTI assessments.

North Carolina

Best practice. Coherent state system; alignment of curriculum and assessment; state data system; statewide articulation

Coherent CTE state system. *North Carolina* is a state with a centralized system of CTE. Competency-based courses are offered in eight program areas, with each area having school-based, work-based, or community-based learning.

Alignment of CTE curriculum and assessment. The alignment is accomplished through the Vocational Competency Achievement Tracking System (VoCATS) system. The VoCATS helps school districts plan, implement, and evaluate workforce development instruction. This system provides the current status of student performance and provides documentation for course competency mastery and gains.

VoCATS is a competency-based, computer-supported system encompassing the following:

- Course planning

- Lesson planning
- Test/assessment items
- Aggregrated and disaggregated reports by students, by class, by teacher, by school, and by LEA

VoCATS includes over 129 course blueprints validated by business and industry. Each blueprint includes course competencies and objectives. In addition, item banks are distributed electronically for each of the courses. Curriculum guides are provided. Secured end-of-course tests or post-assessments are generated from the state.

The VoCATS system has received recognition from the U. S. Department of Education as a national instructional model in Workforce Development Education. The Rand Corporation has cited VoCATS as an exemplary statewide system to assess student learning in Workforce Development Education.

State data system. *North Carolina* has an extensive system for follow up of CTE concentrators. In addition to the VoCATS assessments, a follow-up survey and phone interview protocol are provided to school districts.

Statewide articulation. The statewide articulation process began in 1998 as a joint effort between the State Board of Community Colleges and the State Board of Education. While the statewide articulation is focused on student transition from high schools to community colleges, the university system is a partner in the process. Courses are identified and aligned, including use of industry-based certifications. Criteria are established for awarding of college credit. To document credit, *North Carolina* uses grades in the course and a cut score on the VoCATS post-assessment scores. Articulation models include time-shortened, advanced skills, and technical preparation associate degree programs.

Ohio

Best practice. Policy forums; Integrated academic and technical curriculum; curriculum development process

Policy forums. *Ohio* has created a series of forums engaging stakeholders around a set of "policy advances." Policy is defined as a plan or course of action. Advance is defined as "to move or cause to move forward." The policy advances are: (1) responsiveness of the CTE system to the economic future of the state: (2) collaboration – being a full partner in both workforce development and school improvement; (3) seamless pathways to acquire advanced skills and credentials; (4) access to a career-focused education for all students; (5) technical expectations – aligning CTE programs to business and industry expectations; (6) academic expectations consistent with state academic standards;

(7) accountability and continuous improvement strategies; and (8) innovation and inclusion of best practices and proven models.

Integrated academic and technical curriculum. Based on *Integrated Technical Academic Competencies* (ITACs), the model includes technical competencies validated by business and industry committees, academic competencies based on state standards and applicable to the career pathway, and employability standards reflected in the core ITAC for all pathways.

ITACs provide a career pathway that can lead to employment or further education. Each profile includes a comprehensive listing of occupational skill competencies that reflect the job opportunities and skills that are required to work in a specific profession/career pathway. Critical academic, employability, and information technology skills have been integrated throughout the list to support the technical skills.

ITACs are used as the basis for curriculum development in *Ohio*'s secondary, adult, and post-secondary programs (see table 11). Criteria include authenticity, adult connections, academic rigor, active exploration, applied learning, and alternative assessments. Final assessments will be designed to accompany each profile list and to accommodate student evaluation by modules**.**

Table 11
Components of *Ohio*'s ITAC Curriculum Model

Component	Description
ITAC Competencies	Core, Cluster, and Specialization ITAC competencies are identified.
Academic Competencies	Math, Science, Language Arts, Social Studies, Arts, and Foreign Language connections, as appropriate, are identified for each scenario. In some instances, direct linkages are made to *Ohio*'s academic models.
Scenarios	ITAC Scenarios are real-life workplace situations that engage learners in solving problems or performing tasks to demonstrate knowledge and skills in context.
Guiding Questions	Guiding questions that follow each ITAC scenario provide a learning guide by targeting specific information to be learned and keep the focus on intended skills and knowledge.
Project and Learning Activities	Project-based and other learning activities associated with learning in the context of an ITAC scenario will be provided. Activities will have motivating introductions, varied individual and group activities, and student handouts.

Component	Description
Alternative Assessments	A variety of assessments will be usable for ongoing feedback to students and by different assessors--employers, parents, other adults and students.
Teacher Information	Teacher information provides necessary background information, and preplanning and implementation tips.

Curriculum development process. *Ohio*'s process for developing ITACs begins with an encompassing research and review of existing competency profile lists and includes input from industry, labor, professional organizations, professional and industrial representation, and national standards for a specific industry/profession. Representatives from a broad cross-section of *Ohio* professional organizations, businesses/professions, industry, and labor played a critical role in identifying current and future knowledge and skills for the industry and in defining the vision and scope of the profession/industry. The instructional methods and teaching strategies are the responsibility of the local school system and/or instructor.

A professional panel identifies what the student should be taught but not how or when the student should be taught. The how of instruction is the decision of the teacher, advisory board, and/or school administration. School advisory boards can add competencies to the profile that are viewed as essential for local employment of graduates. The sequence of instruction is also a local decision. Students may learn some of the competencies while placed on the job in a program that incorporates early job placement in a cooperative learning situation.

Ohio's Tech Prep curriculum base is being developed through a three-phase process involving business, industry, and labor representatives as well as secondary and associate degree educators that results in State Tech Prep Technical Competency Profiles. The process begins with business, industry, and labor input, includes instructors in the second phase to assign competencies at the secondary and postsecondary levels, and concludes with a combined group to work through any differences.

Oklahoma

Best practice. Coherent state system

Coherent state system. *Oklahoma*'s vision says*, "We are securing Oklahoma's future by developing a world-class workforce."* Its mission is to prepare *Oklahoma*ns to succeed in the workplace. Goals are as follows:

- Strengthen access to our programs and services for all students and employers

- Engineer new products, programs, and services
- Communicate the role of the system in securing *Oklahoma*'s economic future
- Unleash the power of partnership
- Realign and expand resources
- Enhance performance and quality

Oklahoma has an extensive set of evaluation criteria for each program area (e.g., trade and industrial education. The state has identified a focused set of performance measures:

- Performance and quality
    - Quality of graduates
    - Quality of students placed
    - Quality of programs and services
- Customer satisfaction
    - Employer satisfaction
    - Student satisfaction
    - Partner satisfaction
- System efficiency
    - Cost/benefit ratios
    - Alignment to business needs
    - Cycle time for programs and products

Oregon

Best practice. Coherent state system (linked to state high school reform)

Coherent state system (linked to state high school reform). *Oregon*'s Certificate of Advanced Mastery (CAM) is designed to assure that each student is prepared for successful transitions to his or her next steps. The State Board adopted new graduation requirements that link the high school diploma with some but not all elements of the CAM beginning with students graduating in the 2006-2007 school year. The CAM requirements provide a statewide framework for schools with local flexibility for implementation.

Students have five requirements for CAM certification:
- Develop an education plan and build an education profile
- Meet the performance standard for extended application through a collection of evidence
- Demonstrate career-related knowledge and skills
- Participate in career-related learning experiences as outlined in the education plan

- Meet specific Certificate of Initial Mastery (CIM) performance standards in English, mathematics, science, and social sciences through CIM assessment options

Pennsylvania

Best practice. Technical assessment system

Technical assessment system. *Pennsylvania* utilizes several methods of measuring the occupational competency of career technical education students. NOCTI assessments, given at the end of program, are the primary method. In addition to NOCTI, industry-specific assessments are also utilized. The National Institute for Automotive Service Excellence (ASE) and American Welding Society (AWS) programs are examples of cases in which industry-specific tests may be used. *Pennsylvania* recognizes that NOCTI tests do not necessarily parallel local curriculum but notes in its assessment guide that, given NOCTI's basis of industry/business standards, there should be a high degree of correlation between NOCTI test content and a strong curriculum in the occupational field.

Pennsylvania sets a statewide cutoff score to establish a competency standard that will reflect those skills employers expect from entry-level workers. The cut score is current defined as the NOCTI national norm from the previous year.

Students who successfully meet the State's requirements are awarded a *Pennsylvania* Skills Certificate. This certificate is an important addition to students' portfolios when exiting the secondary career technical education program and may be used to certify competence with potential employers.

The *Pennsylvania* Skills Certificate program was established by the Governor to recognize high achievement of career technical students. A student receives the *Pennsylvania* Skills Certificate by scoring at or above the national norm on the NOCTI test or one of the other state-approved tests. The NOCTI score is comprised of both the written and performance components. Results are also used to determine an improvement score in the School Performance Funding initiative that can result in incentive funds to schools.

South Carolina

Best practice. CTE state strategic plan

CTE state strategic plan. With broad stakeholder input, *South Carolina* developed *2020 Vision for Career and Technology Education in South Carolina.* The document establishes the state strategic plan with ten themes: accountability, business relationships, curriculum, funding, leadership, marketing,

professional development, recruitment, structural change, and technology. State staff members build their plan of work for the year from the strategic plan and it is integrated into local school district plans (Couch 2003).

Utah

Best practice. Technical assessments

Technical assessments. *Utah* established a core set of skills identified by the state Applied Technology Education program specialists and teachers, with the support of business and industry. Each of the assessments in the Skill Certification program is designed to find out how individual students, programs, schools and districts are performing based on a set of standards used consistently throughout the state. Districts receive an incentive based on the performance of their students on the assessments in the various program areas. In addition, students who pass the performance assessment and answer 80 percent of the questions on the multiple-choice assessment correctly receive a certificate that lists the standards measured by the test. While the assessment system is not a formal certification program, the certificates issued to students can be used when seeking a job or in applying for further education and training as evidence of their accomplishments. When available, industry-developed and licensure or certification tests are utilized.

Virginia

Best practice. CTE diploma seal of achievement; CTE performance on state report card

CTE diploma seal of achievement. The *Virginia* State Board of Education created a diploma seal of achievement for career technical education. For students to earn a career technical seal, they must (1) fulfill requirements for a standard or advanced diploma; (2) complete a prescribed sequence of courses in a CTE concentration or specialization; and (3) maintain a B or better grade in CTE courses, pass a board-approved industry certification exam, or acquire a professional license in a CTE field.

CTE performance on state report card. *Virginia* provides each high school with a report card that disaggregates the data regarding the performance of students enrolled in at least one career technical course at the time they complete an end-of-course exam. The state asks school leaders to analyze the data and have academic and career technical teachers work together in analyzing the data to see what specific actions they can take to advance the achievement of career technical students. Career technical teachers are also asked to align their curriculum to *Virginia*'s core academic standards of learning

and to plan instructional assignments that would require academic knowledge and skills to complete. The state is also providing staff development for career technical teachers that focus on the major weaknesses. Also, if schools fail to meet the state standards, the state is requiring that they refocus ways to spend their Carl Perkins funds so that these monies can be used to close the achievement gap.

Washington

Best practice. Workforce employer survey

Workforce employer survey. The Workforce Training and Education Coordinating Board in *Washington* surveys *Washington* state employers every two years to identify employers' workforce training needs and practices and their satisfaction with workforce training programs. The Board shares the information with policymakers and program administrators.

Summary

Based on the previous analysis of the CTE system in Arizona, state CTE best practices were selected for this chapter.   Table 12 organizes the information presented in this chapter by best practice.

Table 12
State Best Practices

Best Practice	States
Access and elimination of the general track	Georgia
Alignment of CTE curriculum and assessment	North Carolina
Apprenticeship program	Georgia
Career pathways	Michigan, Ohio
Coherent CTE state system	Maryland, North Carolina, Oklahoma, Oregon
Concurrent enrollment	Arkansas
CTE performance on state report card	Virginia
CTE standards	New York
CTE state strategic plan/policy forums	Ohio, South Carolina
Curriculum development process	Ohio
Dual enrollment	Georgia
Integrated academic and CTE curriculum	Maryland, Ohio
Integrated academic and CTE policy	New York

Best Practice	States
Scholarships for CTE students	Florida
State data system	Florida, North Carolina
Statewide articulation	North Carolina
Technical assessment system	Connecticut, Pennsylvania, Massachusetts (in process), Utah
Technical endorsement on diploma/ CTE diploma seal	New York, Virginia
Workforce employer survey	Washington

Arizona is encouraged to review these practices and investigate those that are most promising.

Chapter 10
State Policy and Leadership

This chapter addresses the essential question, *What state policies support quality CTE programs?*

Leadership and Governance

Research supports the need for strong state leadership in CTE. In a recent study of state leadership (Kister 2001), the structure of state governance was a key factor in determining the strength of CTE in states. The employing agency for state directors in 2001 (Kister) were as follows:

- 36% state department of education
- 7% higher education board
- 7% other (board for career technical education and state workforce board)

State directors described forces impacting state governance: politicization of the work, changes in structures such as mergers with community college systems and downsizing in state agencies, and collaborations with academic education and the workforce development system.

State Centralization versus Decentralization

Stasz and Bodilly (2002,) in a draft report to the NAVE panel based on state case studies, found that centralized systems were more likely to be implementing significant reforms directed at vocational education. Centralized systems tended to mandate policy changes that resulted in more coherent and uniform vocational programs. The researchers concluded that clients tended to understand the system and to move easily within it. Conversely, state structures with decentralized authority and overlapping delivery systems promoted vocational improvement through voluntary means. The result was often more variety in program offerings but less coherence.

Stasz & Bodilly also found that state reforms appeared to have more influence over vocational education than Perkins III. State policies emphasized academic achievement and accountability.

Leaders of national career technical education reform movements stated unequivocally that state leadership was key to successful implementation (Kister 2001). Peters (1987) studied the identifiable factors at the state level that

influenced the quality of a state's vocational education system. Based on a case study of states identified as having a high-quality vocational education system, the major influence on the quality of a state's system was continuity of leadership—particularly state directors of CTE.

In the 1994 NAVE report (Boesel, Huson, Deich & Masten 1994; Boesel & McFarland 1994), state support for Perkins reforms was strongly and positively related to vocational enrollments. Of all the state variables, the one most strongly related to enrollment changes is *"state leadership in general."*

CTE requires a more centralized system to deliver than is feasible in most individual school districts. State-level operations provide economies of scale as well as size and scope of products and services required for quality (Kister 2001). Large states such as *Florida, California,* and *Texas* have regionalized CTE administration.

Bottoms (2002) says,

> *SREB has witnessed a larger percentage of HSTW network schools making improvements in states that have made providing technical assistance and coaching for high school reform a primary responsibility for their entire career technical staff. States that have limited the amount of technical assistance to either a full- or partial-assignment of one individual have a lower percentage of their HSTW sites making progress. Too few states are using the full potential of their federal vocational dollars to encourage high schools to improve the quality of both academic and career studies provided to students.* (p.14)

Large systems do not change much without considerable outside pressure that forces change and legitimates internal change agents. Cohen (2001) said: *"If we depend entirely on a cadre of self-motivated, visionary educators, 20 years from now we will still have a handful of islands of excellence in a sea of mediocrity."* States need to help local educators develop the capacity to change their own schools, to test out new models and visions.

State CTE Legislation

Several states have sponsored state legislation that has strengthened CTE as a part of its academic reform. *West Virginia* and *Kentucky* have such legislation. *South Carolina* in 1994 enacted a state school-to-work bill to eliminate the general track and redefine vocational programs for content, relevancy, and rigor and to integrate instruction in academic and occupational courses. Recently, the Governor in *South Carolina* established a Workforce Education Task Force that led to a set of recommendations for systemic education reform.

Career preparation is an integral element of the *Michigan* CTE system. Michigan's Career Preparation System was created through amendments to the FY 1997-98 School Aid Act and by a 1997 Executive Order from the Governor. The goal is to organize and fully integrate various career preparation components—such as workplace readiness and mentoring—into *Michigan*'s educational system. Several states, including *Ohio,* have legislation authorizing funding for support of HSTW implementation.

Mission of State CTE Agency

The mission of the Career and Technical Education Division in the Arizona Department of Education is to *"provide leadership and support for schools that prepare students for transition from school to careers."* Other selected state agency mission statements (McPhee 2003 and state websites) follow:

- *Florida.* The mission of the Division of Workforce Development is to provide quality programs, timely responses, technical assistance, and performance accountability to enhance economic self-sufficiency.
- *Kentucky.* To be an education system which serves the needs of all students pursuing career technical education and skills training.
- *Maine.* To support services to school administrative units and technical colleges that assure the acquisition of career and life skills.
- *Michigan.* To ensure that all students completing the Michigan education system will have the necessary academic, technical, and work behavior skills to enter, compete, and advance in the career field of their choice.
- *New Hampshire.* A vision for the integration of vocational-technical education into a total educational philosophy for our state which will ensure that every citizen of New Hampshire graduates from high school ready and prepared for higher education and the world of work.
- *New Mexico.* To provide quality leadership to New Mexico's educational communities resulting in a prepared workforce.
- *New York.* To provide quality career technical education programs in schools and Boards of Cooperative Education Services (BOCES) as a first choice option for students to achieve the State learning standards.
- *Ohio.* The Office of Career technical and Adult Education will be recognized as one of the best in the country by the year 2005. Mission is to provide leadership to raise expectations, build capacity, and improve results of career, technical, and adult education programs and services.
- *Oregon.* The Office of Professional Technical Education (OPTE) provides leadership in coordinating professional technical instruction, academic content, and career-related learning experiences to prepare secondary (grades 9-12) and postsecondary (community college and higher education) students for further education and entrance into the workforce.
- *South Carolina.* To develop an integrated learning system that enables students to be successful in a global economy.

Some mission statements encompass workforce development; others focus more on the dual purpose of academics and technical studies. Themes in these agency statements include preparation for higher education and work; academics, development of academic, technical, and career skills; integration into the state education system; and quality leadership and programs.

Funding

Each year approximately $13 billion (federal, state, and local combined) is spent to support the vocational education system. Federal funding constitutes approximately seven percent of state vocational education spending.

A study by Arum (1998) found that students who take secondary vocational courses in states that spent money on these programs *"have dramatically different outcomes than do students who take such courses in states that spend little on these programs"*. Arum concluded, *"To the extent that preventing students from dropping out of high school is a goal of these [vocational] programs, sufficient financial support is necessary for these programs to succeed"*. He said dropout rates were significantly affected in states such as *Ohio* and *Florida* that invested high levels of resources in vocational education.

State Funding Models

The relative cost for vocational education is estimated to be 20 percent to 40 percent greater than that of academic instruction, varying considerably by program area and content level. Most states provide some type of categorical funding for career technical education. A national survey identified four broad categories for funding vocational education (Klein 2001):

- State foundation grants that are intended to ensure that all students in a state receive a minimum level of basic education services. States in this category do not budget additional supplemental funding for vocational education.
- Unit cost funding in which methods for determining funding formulas are based on unit cost by student participation, instructional unit, or cost reimbursement
- Weighted funding per students
- Performance funding

Klein suggests that policymakers—legislators and state administrators—agree upon the goals for vocational education and address these questions:

- What are the purposes of vocational education?

- What types of vocational programs and instructional settings should be encouraged and to what extent?
- Is a state willing to fund traditional vocational programs tied to fields that may be low paying and relatively expensive to equip, or is the desire to redirect instruction into other fields that may require less equipment and offer graduates higher-paying jobs?
- How much flexibility should local agencies have in allocating resources across programs?
- Is there a threshold level of funding that local agencies must exceed if they are to offer vocational programs, and if so, what is it?

In February 2001 the *Wyoming* Supreme Court directed the state to modify its school finance formula to account for the actual cost districts face in providing vocational teachers and equipment. MPR Associates (Klein et al. 2002a, 2002b) contracted to perform the study with input from an advisory panel of career technical educators in *Wyoming.* Since Arizona has some geographical areas with sparse population, like *Wyoming*, there may be some policies and practices in the report that could be replicated.

The recommendations which were approved by the *Wyoming* finance advisory panel and passed by a legislative committee (currently in the legislative process) were (1) for the state to choose to apply a 1.29 weighted adjustment to all FTE vocational students statewide or (2) to institute a two-program minimum quality standard with a continuous weighted adjustment to ensure that all students have access to a minimum program of vocational studies. The study also recommended start-up grants to assist in introducing new coursework and additional resources for state level staff to support the collection and analysis of student participation.

Arizona Funding Model

Federal and state CTE funds in Arizona are to be considered *supplemental* to districts funds (Erickson 2002). The district is expected to support CTE programs with local district funds.

A recommendation made by the CTE Advisory Committee and approved by the State Board was to distribute state funding to districts based on new criteria and weights for approved CTE programs. A Division update dated July 15, 2002, stated that there had not been legislative approval for the change. Currently, enrollment and placement funding levels are still 75 percent and 25 percent, respectively, of the total assistance funds available. None of the other categories can currently be used in the funding formula.

Placement funding for samplers (students taking only one occupational class) will be administratively reduced to five cents on the dollar to reflect the Board's

recommendation that only program concentrators and completers be funded for placement success. Placement funding is for CTE program samplers, concentrators, and completers who are in a related placement nine months after graduation. Funding is earned only if the placement is related to the graduate's secondary CTE program of study.

Funding Issues

The following funding issues may be pertinent for Arizona.

Prioritizing for labor market needs. Arizona created a formula for ranking CTE programs based on job demand data and quality wages:

Average job openings (X2) + O*Net Academic Score above 300 (X!) + Average wages (X.5) + Technical Score (X.5).

The following weights are used:
Program rankings	1-12 =	100%
Program Rankings	13-24 =	90%
Program Rankings	25-36 =	80%

Indiana has also created a formula for applying differential weights for labor market area and according to their Director of the Office of Career and Technical Education believe that it is resulting in increased programming in high demand programs (Schute 2003).

Missouri supplements base funds for CTE through an "Effectiveness Index Formula." The index is based on two factors: (1) the relative success of placing students on jobs (addressed below) and (2) the responsiveness of a particular program to labor market supply and demand factors. The labor market supply and demand component is based on the proportion of instruction delivered in high demand, low demand, and balanced demand programs. A high demand program is one where estimated annual job openings exceed supply by 20 percent or more. A low demand program is one in which the estimated supply of qualified workers exceeds the estimated annual job openings by 20 percent or more.

In *Utah*, as part of the Legislature's 1995 initiative, ten percent of Applied Technology Education funding was to be distributed through the Skill Certification program. In 1997, this percentage increased to 12 percent for incentive funding.

Minimum size per class. Perkins III requires that CTE programs *"must be of sufficient size, scope, and quality to be effective."* The realities of states with sparse populations must be considered. Given the differing bases and complexities of funding, it is difficult to compare states' criteria for minimum size.

Performance based funding. Arizona allots 25 percent of funds for related placement for concentrators and completers. A *concentrator* is defined as a student who achieves two Carnegie units/credits in a single CTE program*.* A *completer* is a concentrator who (1) passes the state-adopted proficiency assessment or (2) in the absence of a state proficiency assessment, passes at least 80 percent of the total program competencies and is documented as attaining at least 80 percent of the occupational Level III program competencies in an approved CTE program.

Missouri also includes a placement factor in its incentive funding. The placement score is calculated from the proportion of students in the follow-up population whose post-school activities are in related activities (employment, continuing education, or military) and in non-related activities. According to the State Coordinator for Vocational Technical Education, the incentive system is working, but they do plan some adjustments (Harden, 2003).

Klein (2001) analyzed state funding systems for all 50 states. He suggested that states that adopted performance-based formula that rewarded programs in high demand labor market areas or those with high placement rates should consider earmarking funds for districts seeking to change their program offerings. Otherwise, districts that did not qualify for incentive funding may find it difficult to ever generate sufficient resources that would allow them to implement relatively higher-quality instructional programs. He also cautioned that state incentive systems should adjust for district size, especially given the greater availability of jobs in metropolitan areas as well as the larger number of potential completers.

A central question is whether the incentive system supports the central mission of CTE. Klein cited *Missouri's* funding system in which they award similar points for students who find employment or who enroll in continuing education. A higher weight is applied to students who pursue postsecondary education than to those in unrelated education, which could include pursuit of a baccalaureate degree.

Pennsylvania initiated a School Performance Funding Initiative in 1998. For area vocational-technical schools, the achievement component is determined by student performance on NOCTI or other approved tests.

Cost Efficiencies

In a report related to the Wyoming advisory panel study, Klein (2002) identified some cost-effective strategies being used in districts to better utilize limited resources for CTE in Wyoming. These included:

- Part-time instructors or "multiply endorsed" instructors (e.g. health and science)

- Electronic classrooms/distance education
- Multiple-level classes
- Leasing equipment, particularly computer technology equipment
- Student-based enterprises, including auto repair, home construction, food service
- Teacher sharing within school districts and among school districts
- Partnerships with industry
- Community-level partnerships such as Habitat for Humanity
- Partnering with postsecondary institutions including concurrent enrollments and teacher sharing with local community colleges

School Structures

Many states deliver career technical education through area centers. The model for most states is that of half-day programs with academics at the home school. Most of *Ohio's* 49 area career centers are full-time but are designed for juniors and seniors.

During the 1960's, *Delaware* initiated a system of shared-time career technical high schools in which students spent half of their day receiving academic instruction at their home high school and the other half of the day at a career technical high school. However, drawbacks to this system were deficiencies in the level of academic programs offered to shared-time vocational students (low expectations), loss of instructional time (due to busing), shared-time schools seen as "dumping grounds" for traditional schools to send problem students, and employers who complained of low-quality graduates who needed higher-level academic skills. It should be noted that other states have reported similar problems.

In 1990, *Delaware* created full-time comprehensive Grades 9-12 career technical high schools. The three districts, working collaboratively, became HSTW sites. A decade later, the benefits of converting shared-time centers into full-time comprehensive career technical high schools and utilizing the key practices of HSTW programs have created a mission and focus for career technical education that integrates modern technical studies with the equivalent of college prep curriculum in language arts, mathematics, and science.

Each of the five career technical high schools in *Delaware* is a choice high school. Eighth graders from throughout each county apply to attend. The career technical schools require two more credits for graduation than traditional high schools. *Delaware* staff report that the career technical schools now have waiting lists for admission. *Delaware's* system of full-time comprehensive career technical high schools has brought focus to high school and, with that focus, increased student achievement. *Massachusetts and New Jersey* also have full time 9-12 centers.

Massachusetts has proposed regulations that would give vocational schools the ability to reject students for admission if they fail English or math courses in the eighth grade. The proposal requires vocational schools to align their curriculum with new standards in math and English. The proposal also includes requirements for incoming vocational teachers to take more courses in English, math, and science. While they raise standards for CTE programs, the proposal also gives more emphasis to credentials earned by vocational students. As described in Chapter 9, *Massachusetts* has adopted the *Certificate of Occupational Proficiency* to signal a high degree of skill or knowledge in a particular area.

Summary

Research supports the need for strong state leadership for CTE. States with more centralized systems were more likely to implement significant CTE reforms.

Themes in state CTE agency statements include preparation for higher education and work; development of academic, technical, and career skills; integration into the state education system; and quality leadership and programs. The ADE, CTED may wish to review these CTE agency statements for its own agency mission as a part of the broader recommendation to develop a shared mission for CTE.

Each year approximately $13 billion is expended for CTE.   State and local dollars constitute approximately 93 percent of career technical funding. A few states include provisions for CTE in the basic state foundation grants. The majority of states provide additional funding based on units, weighted funding, or performance. As Arizona considers changes in its CTE delivery system, there should also be consideration of the funding system.

The chapter concludes with a discussion of school structures. There may be potential for more regional career centers such as East Valley Institute of Technology or the full time models in *Delaware* and *Massachusetts.*

Chapter 11
Summary and Recommendations for Implementation of a Career Technical Education Delivery System in Arizona

> ***It's not the strongest of the species that survive, nor the most intelligent, but the ones most responsive to change***.
>
> *Charles Darwin*

Hamel (2000) says that successful companies are not getting *"better,"* they're getting *"different."* Only companies capable of creating revolution will prosper in the new economy. There are parallels for CTE. The verbs for the revolution are *"dream, create, explore, invent, pioneer, imagine."* Hamel says that companies fail to create the future, not because they fail to predict it, but because they fail to imagine it. These recommendations for CTE in Arizona call for bold action.

Based upon the review of documents and the research conducted in Arizona, it appears that there is much to be commended in the current CTE system. Both the state accountability system and revised system of curriculum development are strengths. While the recommendations will address the need for more robust assessment measures, the current reporting system should be able to accommodate different components. The curriculum development process was revised based upon input from a *Curriculum Design Process and Materials Format Report.*

The regular meetings of local CTE Directors with Division staff provide for frequent communications. The *2001-2002 Customer Satisfaction Survey Report* showed a high level of satisfaction of the local directors and teachers with the services of the Division.

Major Recommendations

The following major actions are recommended.

1. Develop, with input of all stakeholders, a shared vision and a clear and compelling mission statement. Disseminate widely and use consistently in all communications.

Based on the survey data from business and industry, CTE directors, and CTE teachers and the focus group, it appears that there is not a shared vision and mission for CTE in Arizona. The directors and teachers had a clear sense of the

current delivery model, policies, procedures, and of the accountability system expectations. However, there appeared to be a lack of clarity and engagement about the purposes of CTE.

A process should be implemented to involve representatives of major stakeholders—students, parents, educators (teachers and administrators, higher education), business and industry (including representation of the Governor's Workforce Policy Board), and government—in clarifying the vision and mission for CTE in Arizona. Refer to Chapters 2 and 3 in this report for discussion of CTE mission from national leaders in the CTE field, missions in benchmarked states, and national policy. Also review *Ohio's* initiative for policy forums and *South Carolina's* strategic plan.

The second part of the recommendation is to communicate a new shared vision and mission within the CTE community and to the citizens of Arizona.

2. Increase the access to CTE for more students.

Arizona has the highest dropout rate in the nation—a high school completion rate of 73.5 percent (1988-2000 average) compared to the national average of 85.7 percent (NCES 2002).   Some career technical leaders assert that there is an inverse relationship between state dropout rates and access to CTE programs. This assertion suggests that the state should consider policies that promote increased access to CTE programs. Access to a career-focused education for all students increases options for careers and continued education. Consider these actions:

2.1   Determine the percentage of students served in CTE as participants, concentrators, and completers as a benchmark and set targets for enrollments in the next five years.

2.2   Review state policies for high school graduation that eliminate the general track and require all students to take a concentration, one concentration area being career technical. Consider adapting *New York's* technical endorsement or *Virginia's* CTE diploma seal. Scholarships, such as those provided in Georgia and Florida for CTE students, also increase access for students to postsecondary technical education.

3. Eliminate the mandate for the current three levels for the Arizona CTE delivery model. Replace with a set of competencies that are industry determined, reflect the national career clusters, and span grade levels into postsecondary studies.

Students in Arizona will be competing in a national and international labor market. Every student deserves access to a quality CTE program that is

benchmarked to national and international standards. These should be provided by the Arizona Department of Education, CTE Division. Refer to Chapter 7 for suggestions from survey respondents, to Chapter 4 for a discussion of CTE standards, to the *Curriculum Design Process And Materials Format Project Report* commissioned by the ADE, CTED in 2001, and to the discussion in Chapter 6 regarding state CTE pathway design.

Currently the Department is prescriptive of both standards and process. Local school districts vary considerably in size, structure, and resources. Therefore, local districts should retain the flexibility to determine how those standards translate into a program of study and delivery. The caveat, however, is that students have access to quality courses that meet the state standards and that schools administer technical assessments (see Recommendation 4).

Based on the survey and focus group input, the following actions are suggested for consideration:

3.1 Require a sequence of a minimum of three courses, preferably four, in a single labor market area for those students who select a career major. (See Chapter 6 for research rationale for concentrations in a career technical area).

3.2 Explore possible options for initiating and/or expanding concurrent and dual enrollment options. (See Chapter 8).

3.3 Using the curriculum development processes refined from the 2001 *Curriculum Design Process and Materials Format Project Report,* continue the state system for developing state standards and competencies, including greater input from business and industry.

3.4 Increase district flexibility by eliminating the specifications for grade level delivery. Provide alternative models and guidelines instead. Note that several schools requested that Level I be provided at ninth grade.

3.5 There does not appear to be a comprehensive career development process at the middle school. Several states require individualized career plans required at the end of eighth grade (see *Ohio* and *Michigan* for examples).

3.6 Explore models for providing stronger transitions from middle school to high school that include a career component—e.g., Talent Development High School, the SREB Transitions project that includes competencies to be developed for success in high school, and the ninth grade "Freshman Success Academy" program from the National Academy Foundation.

3.7   Design a three-course sequence that enables students to enroll in what are now Level III courses in the tenth grade. Provide funding at the tenth grade for those students.

3.8   Use the States Career Cluster Initiative as a model for career pathway development.

3.9   Develop alternative pathways for students who wish to explore and for those who wish to prepare for careers. Refer to *Washington's* proposed model.

4.   Institute a system of technical assessments for CTE.

The trade-off for the flexibility in Recommendation 2 is accountability for outcomes. The current system of sign-off for competencies is not robust for accountability purposes and does not offer value to students for their graduation portfolios. It is suggested that a review team study the issue of technical assessments.

One of the major issues for technical assessments is the extent to which industry certifications are used at the secondary level. As noted in Chapter 5, there is increasing fragmentation in both the nature of industry certificates and the suppliers such as private vendors, trade associations, and not-for-profit associations. Further, there is considerable concern as to the appropriateness of industry certifications at the secondary level, particularly for broader career clusters.

Several states give end-of-program assessments and provide district and state reporting. Other states, such as *New York*, require all programs to have end-of-program assessments in order to receive funding. The National Occupational Competency Testing Institute (NOCTI) offers pre-and post-testing in over 75 occupational areas and is working with the States Career Cluster projects to develop cluster assessments. Most states with strong accountability systems prescribe an industry certification test, a licensure test (particularly health and cosmetology), or an end-of-program assessment such as NOCTI. *Pennsylvani*a and *Connecticut* are two states that use the NOCTI assessments statewide with state reporting. The state CTE assessment research being done for the Certification of Occupational Proficiency in *Massachusetts* may be helpful.

5. Integrate CTE into the mainstream of high school education in Arizona by strengthening the academic and technical rigor of CTE curriculum and instruction. Investigate High Schools That Work (HSTW) as a whole school reform model that includes a focus on CTE.

Much of the focus in Arizona CTE has been on implementing the structure of the three levels and on the recording and reporting required in the state accountability system. It appears that less focus has been placed on strengthening the teaching and learning processes. However, it should be recognized that considerable effort has been placed in developing new curriculum.

Given the emphasis on the AIMS test, career technical educators are being pressed to contribute to improving the academic skills of CTE students. As noted in Chapter 8, HSTW is recognized nationally because it has compelling data to show improved academic achievement of CTE students. Currently in 27 states, it is a high school reform model that works. As noted in the research cited in Chapter 8, *"externally developed programs may have higher success rates because they tend to be more clearly defined operationally at the outset"* (Nunnery 1998).

Other Summary Observations and Recommendations

6. Delivery structures

6.1   Explore the career academy model that uses the workplace as the organizing theme. Career academies are consistent with the tenets of high school improvement and CTE.

7. Scheduling

7.1   Investigate block-scheduling approaches to recommend to local districts to provide increased access to CTE classes.

8. Data

8.1   Arizona has a comprehensive accountability for CTE. It would be helpful to develop a compelling data message that would communicate the strengths and challenges for the state CTE system. Note: A strength of the High Schools That Work data set is that it can suggest a relationship between outcomes and process. The data are triangulated with the National Assessment of Education Progress-based test in reading, mathematics, and science; a student survey; and teacher survey. CTE field of concentration can further disaggregate the data.

8.2   Explore ways to streamline data reporting requirements, particularly the competency tracking.

9. Assessments

9.1 Provide technical assistance to local districts on alternative or authentic assessments in CTE, including portfolios, capstone or senior projects, career technical student organization skill competitions.

9.2 In addition to the technical assessments that are contained in the major recommendations for this report, suggest working with the community college system to give CTE students community college placement exams at the end of tenth grade with provisions for targeted intervention the last two years of high school. *Maryland* is currently doing this.

10. Program assessment

10.1 The current Arizona program assessment guidelines (five pillars) appear to be consistent with those of benchmarked states, *Oklahoma, Oregon, South Carolina,* and *New York*, and the National Dissemination Center exemplary programs criteria in Chapter 8. It is not clear how extensively the guidelines are being implemented and used to improve practice in Arizona.

11. State evaluation

11.1 Encourage the Governors Workforce Policy Board to undertake an employer survey to determine skill levels needed for CTE graduates and to assess the value of CTE. See the *Washington* employer survey described in Chapters 4 and 6.

12. Professional Development

12.1 Review the compelling data message and all data for gaps in student performance. With representative input from stakeholders, plan staff development directed toward improving student achievement through the use of data analysis. See Chapter 8 for discussion of staff development principles.

12.1 Survey respondents requested staff development that focuses on best practices in CTE and from other states. The National Dissemination Center Exemplary Programs project would be a good starting point.

Review Chapter 9 for state best practices.

12.3   Staff development should maintain an on-going focus on integration of academic and CTE education, including problem and project based learning. The HSTW network has an extensive array of professional development opportunities in this area, including conferences, consultants, and schools to visit.

12.4   Establish a task force to address state and local leadership for CTE, including representatives from state staff, current administrators, and higher education. Review Chapter 8 for suggestions for developing CTE leaders, including state initiatives and sponsoring participation in the National Dissemination Center National Leadership Institute.

Summary

The Division is to be commended for its emphasis on continuous improvement. This is evidenced in such activities as the recent customer service surveys, the curriculum study that resulted in a new process for developing curriculum, a comprehensive state CTE accountability system, and for this study related to the delivery system.

This study concludes with five major recommendations that the findings suggest should be priorities. In addition, there are other recommendations that should result in program improvement. The driver for implementation of the research findings in this report should be the quest for a shared vision and mission for CTE and involvement of stakeholders in redesigning the delivery system.

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State Websites

Alabama	www.alsde.edu/html/sections/sections_details.asp
Arizona	http://www.ade.state.az.us/cte/
Arkansas	http://www.work-ed.state.ar.us/
California	http://www.cde.ca.gov/shsd/
Connecticut	http://www.state.ct.us/sde/deps/adult/index
Delaware	http://www.doe.state.de.us/techprep/index
Florida	http://www.firn.edu/doe/workforce/div_over.htm
Georgia	http://www.doe.k12.ga.us/edtech/index.html
Hawaii	http://www.hawaii.edu/cte
Idaho	http://www.pte.state.id.us/
Illinois	http://www.isbe.state.il.us/secondaryed
Indiana	http://www.doe.state.in.us/octe
Iowa	http://www.state.ia.us/educate/ccwp/ct
Kentucky	http://www.kde.state.ky.us/KDE/instructional+resources/ Career+and+Technical+education
Maryland	http://www.msde.state.md.us/divisions/dctal.html
Massachusetts	http://www.doe.mass.edu/cte/
Michigan	www.michigan.gov/mdcd
Missouri	http://www.dese.state.mo.us/divvoced
Nebraska	http://www.nde.state.ne.us/cte
Nevada	http://www.nde.state.nv.us/octae
New Hampshire	http://www.ed.state.nh.us/CareerDevelopment/voced.html http://www.ed.state.nh.us/schooltowork/career2.html
New Mexico	http://www.sde.state.nm.us/divisions/ctas
New York	http://www.emsc.nysed.gov/workforce/home.html
North Carolina	http://www.ncpublicschools.org/curriculum/vocational/ http://www.ncccs.cc.nc.us/Tech_Prep/
North Dakota	http://www.state.nd.us/vte
Ohio	http://www.ode.state.oh.us/ctae/
Oklahoma	http://www.okcareertech.org/main/sitemap.htm
Oregon	http://www.ode.state.or.us/opte/index.htm
Pennsylvania	http://www.pde.state.pa.us/career_edu/site/default.asp
South Carolina	http://www.myscschools.com/offices/cate/
South Dakota	http://www.state.sd.us/deca/DWCP
Texas	http://www.tea.state.tx.us/Cate/
Utah	http://www.usoe.k12.ut.us/ate/newate.htm
Virginia	http://www.pen.k12.va.us/VDOE/Instruction/CTE
Washington	http://www.k12.wa.us/secondaryed
Wyoming	http://www.k12.wy.us/specialprograms/voced_index.htm

Appendix A
Survey Responses by County, School/District and by Director or Teacher

County	School/District	Director	Teacher
Apache	Chinle HS	x	
	Round Valley HS	x	
	St. Johns USD	x	
	Window Rock	x	
Cochise	Benson HS	x	x
	Bisbee HS		x
	Buena HS	x	
	Douglas HS	x	
	San Simon HS		x
Coconino	Fredonia HS	x	
Gila	Payson HS	x	
Graham	Fort Thomas	x	
	Pima HS	x	
	Safford HS		x
	Thatcher HS	x	
Greenlee	Duncan	x	
La Paz	Salome HS		x
Maricopa	Agua Fria Union HS	x	
	Arcadia HS		x
	Cactus HS		x
	Chandler Unified SD	x	
	Dysart HS	x	
	EVIT	x	x
	Fountain Hills HS	x	
	Gilbert PS	x	x
	Gilbert Jr. High		x
	Glendale Union HS Dist.	x	
	Ironwood HS		x
	Mesa	x	
	Mesquite HS		x
	Metro Tech	x	
	Paradise Valley	x	
	Peoria HS	x	x
	Saguaro HS		x
	Scottsdale Unified SD	x	
	South Mountain HS		x
	Sunrise Mountain		x
	Tempe Union	x	
	Tolleson Union HS District	x	
	Wickenburg Unified	X	

Mohave	Kingman HS	x	
	Lake Havasu HS	x	
	Mohave & River Valley HS	x	
	Music Mountain Jr./Sr. HS		x
Navajo	Alchesay HS	x	
	Blue Ridge HS		x
	Kayenta	x	
	Pinon Unified SD	x	
	Show Low HS	x	
	Winslow HS		x
Pima	Amphitheater PS	x	
	Sunnyside USD	x	
	Tuscon Unified	x	
Pinal	Apache Junction USD	x	
	Coolidge HS	x	x
	Casa Grade Union HS	x	x
	Maricopa HS		
	Nosotros Academy Charter	x	
	Santa Cruz Valley Union HS		x
Santa Cruz	Patagonia Unified HS	x	
	Rio Rico HS	x	
Yavapai	Prescott Unified	x	x
	Valley Academy	x	
Yuma	Cibola		x
	Kofa HS		x
	Mingus Union HS	x	
	Yuma Union HS	x	

Appendix B
Survey – CTE Directors and Teachers

To: Arizona Career and Technical Educators

From: Joanna Kister, Researcher/Policy Analyst

Subject: Survey regarding delivery model/system for career and technical education in Arizona (Approximately 20 minutes to complete)

Please click reply to respond and send by Wednesday, January 22.   Thank you for your input. (If you wish, you can print and mail to: Dr. Joanna Kister, 1260 Windham Rd., Columbus, OH 43220).

The Arizona Department of Education, Career and Technical Division, has commissioned a research project to make recommendations to improve the Arizona Career and Technical Education (CTE) delivery system focusing on a coherent sequence of instruction and exemplary program delivery. I am seeking the input of Arizona career and technical educators. Would you please respond via e-mail to the 5 questions? Your input is vital to assuring that the recommendations reflect the diverse needs of Arizona's schools. Thank you for your time.

Your response will be confidential and tallied in the aggregate.

Name:

Title/Teaching Area:

County:

School:

QUESTIONS:

Given the mission of CTE in Arizona to prepare students for transition from school to careers (i.e. to meet students' career interests, needs and goals and to meet labor market needs) and considering factors such as access for students, time needed for developing state technical standards/competencies; fit with school structures etc,), please review the current model below and respond to the five questions.

Current Arizona model for CTE:

-Level I, which is designed for grades 7 and 8, is the exploratory level. It represents a core of academic and technical competencies that support all occupations and career exploration for all interest areas.

-Level II, which is designed for grades 9 and 10, serves as the transition between the broad exploration provided at Level I and the occupationally specific instruction provided at Level III.

-Level III, which is designed for grades 11 and 12, provides students with occupationally specific preparation that leads to employment after graduation and/or further education and training.

1. Design - On a scale of 1 to 10 (ten being high), how effective is this delivery model in helping students achieve the mission?
==
Your response:

2. Implementation - On a scale of 1 to 10 (ten being high), to what extent does your school use this delivery model?
==
Your response:

3. What are strengths of this model?
==
Your response:

4. What are limitations of this model?
==
Your response:

5. What changes would you make in this model and why?
==

Other comments:

Note: If you would prefer to share these responses in a phone interview, I may be reached at the following number: 614-451-1306 during these dates and times.
Monday, January 13: 11 am – 5 pm MST
Tuesday, January 14: 10 am – 5 pm MST
Monday, January 20: 10 am – 5 pm MST
Wednesday, January 22: 10 am – 5 pm MST

If you would like for me to call you, please send contact information and possible times.

Dr. Joanna Kister
1260 Windham Rd.
Columbus, OH 43220
614-451-1306 Fax: 614-488-9505
jkister@pageville.com

Appendix C
Survey--Business and Industry

To: Members of State Business and Industry Advisory Committees
        Members of Governor's Workforce Policy Board

From: Joanna Kister, Researcher/Policy Analyst

Subject: Business and industry advisory committee survey for career
and technical education in Arizona (estimated less than 20 minutes to
complete)

The Arizona Department of Education, Career and Technical Division, has
commissioned a research project to make recommendations to improve the
Arizona Career and Technical Education (CTE) delivery system focusing
on a coherent sequence of instruction and exemplary program delivery.
I am seeking the input of representatives from Arizona business and
industry. Would you please respond via e-mail to the 6 questions?

Click reply and send by Wednesday, January 29.   Thank you for your
input. (If you wish, you can print and mail to: Dr. Joanna Kister,
1260 Windham Rd., Columbus, OH 43220). Note times at bottom of survey
if you would prefer to share your thoughts by phone.

Your response will be confidential and tallied in the aggregate.

Name:

Title:

Business:

Given your knowledge or experience with recent high school career and
technical high school graduates in Arizona, on a scale of 1 to 10 (10
being highly prepared), to what extent are students prepared in:

1. Basic skills--math, reading, writing?
1. Your response: (Rate 1-10)
Comments:

----
2. Technical skills (e.g., construction trades, hospitality services,
computer services, electronics, nursing services)?
2. Your response: (Rate 1-10)
Comments:

----
3. Employability (e.g., work ethic, problem solving, communications,
attendance, teamwork skills)?
3. Your response: (Rate 1-10)
Comments:

----

4. In which of these three skill areas (academic, technical, employability) do you think Arizona should place more emphasis in its CTE program?
4. Your response:
Comments:

----

5. Are high school CTE programs meeting current and emerging labor market needs?
Your response: (Rate 1-10)
Comments:

----

6. What recommendations would you make for improving the CTE system in Arizona?
Your response (open-ended answer):

Note: If you would prefer to share these responses in a phone interview, I may be reached at the following number: 614-451-1306 during these dates and times.
Monday, January 20: 10 am – 5 pm MST
Wednesday, January 22: 10 am – 5 pm MST
Friday, January 24: 10 – 5 pm MST

If you would like for me to call you, please send contact information and possible times.

Appendix D
Focus Group of Randomly Selected CTE Directors
2/25/03 - Mesa, Arizona

Focus group participants:

Polly Abraham
Dave Dumas
Mary Anne Kapp
Marilyn Keller
Karen Lattin
Joyce Layton
Deborah Maher
Georgia Merrick
Edna Morris
Dolores Watkins

Recommendations:

1. x - Limit to 2 levels
2. x - Limit number of competencies.
3. Not enough time to do industry certificates.
4. Level I should deliver state technology competencies
5. x - Look at Agriculture 4-year model
6. ++5 - Look at exemplary models.
7. x - Do level III only
8. x - Increase flexibility for Levels II and III
9. x - Give 10th graders credit for Level III as concentrators
10. Make CTE standards part of AIMS testing
11. ++2,7,8,1,19 - Provide flexibility to schools to adapt
12. Use data to show academic support
13. One Level II class
14. Assessments/Industry certification instead of competency tracking
15. Redefine 4 core indicators
16. Eliminate grades or competencies
17. x - Relationship between competencies and 4 core indicators
18. ++9Fund Level III – 10th graders
19. x - Do not require certification for Level II

Key: X = Item was combined into another item
    ++ = Item includes the additional identified items

n=10

Priority	Item #	Percent votes
1	11	80
2	18	60
3	14	50
4.5	12	40
4.5	6	40

Summary

The following were the top five recommendations:

1. Eliminate the current model with levels; identify competencies for a career pathway but focus on Level III only for accountability and funding.

2. Fund tenth graders in Level III.

3. Replace the current competency tracking system with assessments that could be end-of-program technical assessments or industry certification depending upon the program area.

4. Use data to demonstrate how CTE contributes to academic achievement.

5. Study exemplary models from other states and the four-year model from Agriculture in Arizona.

Appendix E
Recommendations from Focus Group of CTE Division Staff
2/26/03 – Phoenix, Arizona

1. Arizona has never defined "Program" – need to develop a new delivery system.
2. ++ 13, 19, 23 - Strengthen foundation program.
3. X - Combine level 1 & 2 competencies.
4. Develop flexibility for scheduling.
5. Define the purpose/outcome/criteria of level 3 "Program."
6. ++ 11 - Define programs based on national skill standards/assessments measurable outcomes
7. Analyze – debate input.
8. Scrap the model. Restructure based on exemplary models.
9. ++ 20 - Competencies – not levels.
10. ++ 17 - Define the mission of CTE with a vision toward the next 5-10 years.
11. X - Focus on the assessment/measurement.
12. ++ 15, 22, 3 - Eliminate level 1&2 with coherent sequence in level 3.
13. X - Focus on long-term career path.
14. Involve teachers in development of assessments.
15. X - Accountability level 3, but maintain 1&2.
16. Academic integration.
17. X - Strategic plan in place – transitional issues.
18. Business and Industry input at level 3.
19. X - Assure that junior high/middle schools get foundation.
20. X - Move to competency based system.
21. Fund 10th graders in level 3.
22. X - Combine levels 1&2 in 9th grade – level 3 10th – 12th grade.
23. X - Course development/STW in elementary school.
24. Statewide articulation.
25. Summer programming

Key: X = Item was combined into another item
    ++ = Item includes the additional identified items

n=10

Priority	Item #	Percent votes
1	6	87
2	10	67
3	9	60
4	2	53
5.5	8	47
5.5	12	47

Summary

1. Define programs based on national skill standards and develop end-of-program technical assessments or identify industry certification examinations to assess measurable outcomes.

2. Define the mission of CTE with a vision for the next five to ten years. Incorporate into the development of a state strategic plan for CTE.

3. Move to a competency-based system instead of the current model of three levels.

4. Strengthen the current foundation program, including career development at the elementary and middle school levels.

5. Eliminate the model and restructure based on exemplary models from other states.

6. Combine Level I and Level II, but require a coherent sequence in what is now Level III. Discussion included the suggestion to provide state leadership and instructional resources for what is currently Level I and II, but to require state accountability and funding for Level III only. The combined item also included the recommendation for funding for tenth graders in Level III, although there was some concern that this would dilute total funding to schools, and would be particularly detrimental to rural schools.